Alternative Analysis

State Road 32 Westfield Reconstruction
Westfield, Hamilton County, Indiana
Des. No. 1801731

Prepared for:

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1. Introduction

The City of Westfield, with funding and administrative oversight from the Indiana Department of Transportation (INDOT), proposes to reconstruct State Road (SR) 32 in downtown Westfield from Poplar Street to just east of Timberbrook Run. The proposed project area is roughly bound by Poplar Street to the west, Timberbrook Run to the east, Jersey Street to the south, and Penn Street to the north. The project area can be seen below in **Figure 1** and in **Appendix B**. As the project is receiving funding from the State of Indiana, a state-sponsored environmental assessment will be completed. American Structurepoint, Inc. is advancing this documentation on behalf of the City of Westfield and INDOT.

The purpose of this Alternatives Analysis is to present the project's proposed action and the alternatives under consideration, discuss the results of the analysis, and identify the preferred alternative.

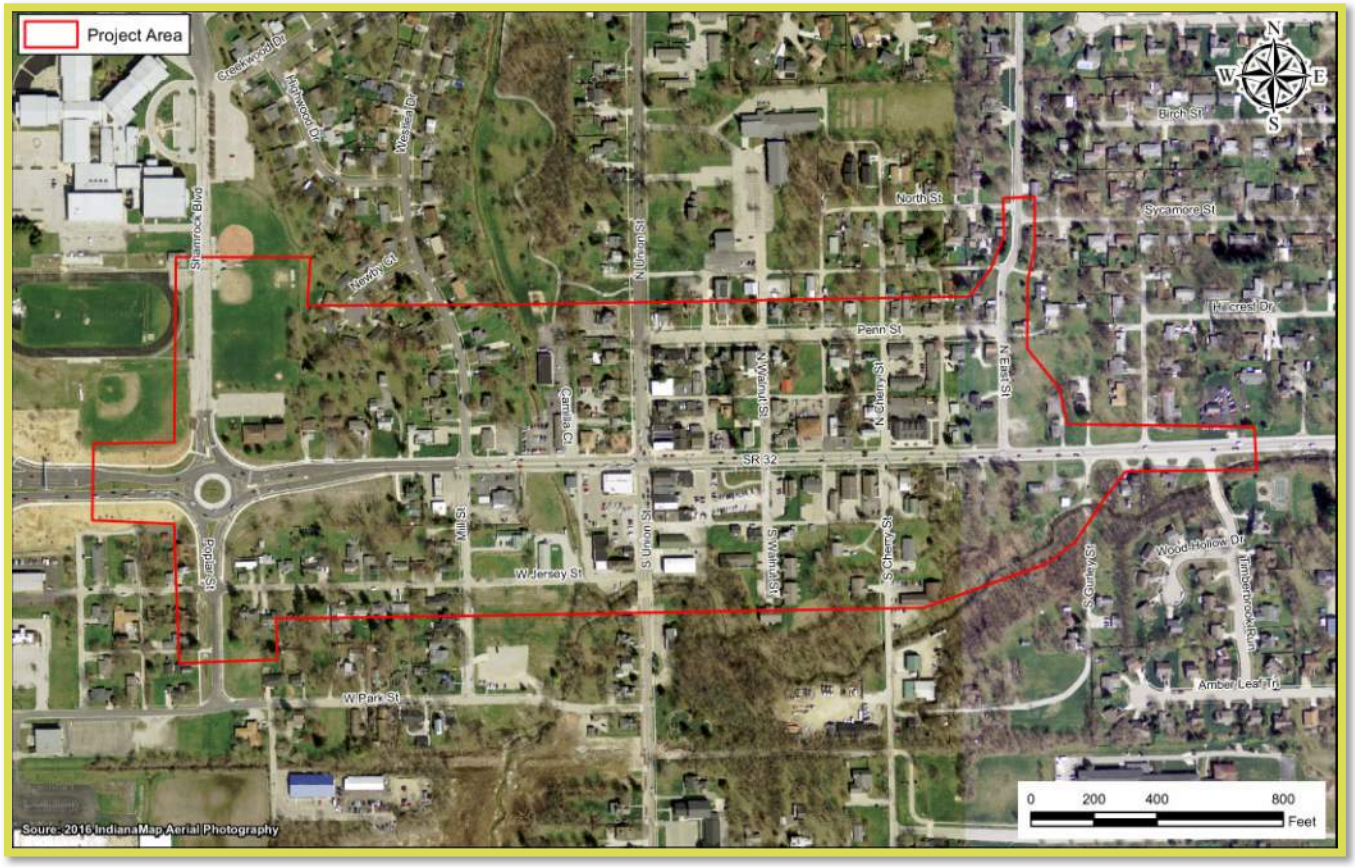

Figure 1: Project Area

1.1 Project Funding

This proposed project is being developed by the City of Westfield, in partnership with INDOT, and was anticipated to receive funding from the Federal Highway Administration (FHWA). Due to the anticipated involvement of federal funds, an environmental assessment (EA) was being developed pursuant to the requirements of the National Environmental Policy Act (NEPA), outlined in 40 CFR 1502.22(b). Additionally, compliance with Section 106 of the National Historic Preservation Act (NHPA), which requires federal agencies to take into account the effects of their undertakings on historic and archaeological properties, was also required. The Section 106 process was initiated and historic properties were identified that were either eligible for listing or listed on the National Register of Historic Places (NRHP).

Since the initiation of the project, including the Section 106 process, federal funding has been removed from the project, and funding of the project is now anticipated to be met through a combination of local and state funds. Due to receiving

funding from the State of Indiana, the project is required to follow the Indiana Historic Preservation and Archaeology Act (IHPAA) outlined in Indiana Code (IC) 14-21-1. The effects on the already identified eligible for listing or listed on the NRHP properties will continue to be considered in the evaluation of alternatives. Additionally, this project is excluded from meeting the requirements of NEPA and instead must meet the requirements of the State Environmental Policy Act (SEPA), outlined in 327 Indiana Administrative Code (IAC) 11. A state-sponsored EA will be prepared for this project to meet the requirements of SEPA.

1.2 Purpose and Need

The purpose of the proposed project is to improve corridor mobility along SR 32 through the downtown Westfield area for both motorists and pedestrians alike. Currently, the existing corridor does not provide a safe traveling environment for motorists or pedestrians, as the existing roadway is congested.

The need is derived from existing field observations, which include extensive queuing on SR 32 both east and west of Union Street. As a result of the queue, traffic flow is impeded at the numerous drives and intersecting roads along the corridor. In particular, the Poplar Street/Shamrock Boulevard roundabout is negatively impacted when slowed or stopped vehicles on SR 32 back up into the roundabout and prevent other vehicles from entering the roundabout. This restricts access from other directions trying to reach the north leg of the roundabout that leads to Riverview Health Hospital and the Westfield Intermediate and Middle Schools. Due to projected growth in the community, as well as planned developments in the area, the existing traffic congestion is expected to increase in the future.

1.2.1 Traffic Analysis

A *Traffic Operations Analysis* (**Appendix C**) was completed by American Structurepoint, Inc. on May 30, 2019 to evaluate the existing and future traffic operating conditions for the SR 32 study corridor. The standard parameter used to evaluate traffic operating conditions is referred to as the level-of-service (LOS). There are six LOS (A through F) which relate to driving conditions from best to worst, respectively. LOS for signalized and unsignalized (stop-control and roundabout) intersections is defined in terms of control delay per vehicle, which is a direct correlation to driver discomfort, frustration, fuel consumption, and lost travel time (**Table 1**). The peak hours for this project were defined as 7:00 AM to 9:00 AM for the AM peak hours and 4:00 PM to 6:00 PM for the PM peak hours. In general for the analysis, the operating conditions of intersections were considered to be acceptable if found to operate as LOS D or better for the overall intersection, with no approach operating worse than LOS E.

Table 1: Level of Service

LOS	Delay per Vehicle (seconds)	
	Signalized/Roundabout Intersections	Unsignalized Intersections
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

Queue lengths were evaluated for all approaches to each intersection to determine the potential impact that queueing at each intersection has on other nearby intersections. The standard parameter used for measuring queueing is the 95th percentile queue length. The 95th percentile queue length encapsulates the traffic conditions occurring 95 percent of the time, and removes the 5 percent of occurrences that are considered to be rare. The 95th percentile queue length was compared to the distance between intersections to determine if the queue length would cause back up into the adjacent intersection. The 95th percentile queue length was compared to the distances listed in **Table 2** below. The eastbound 95th percentile queue length at Union Street was considered to

be an issue when it would begin to affect the Poplar Street approach. This is due to the impact the queue length would have on the Poplar Street roundabout resulting in a restriction of access to Riverview Health Hospital and the Westfield Intermediate and Middle Schools. The westbound 95th percentile queue length at Union Street was considered to be an issue when it would begin to affect Cherry Street resulting in two intersecting streets being blocked by the back up.

Table 2: Distance Between Intersections		
Location		Distance (ft)
From Union Street west to:	Westlea Drive/Mill Street	515
	End of Poplar Street Approach	800
	Inside Poplar Street RAB	1200
From Union Street east to:	Walnut Street	330
	Cherry Street	715
	East Street	1,085

Table 3 below summarizes the capacity analysis results (LOS, vehicle delay, and 95th percentile queue length) for the SR 32 and Union Street intersection. The analysis was completed for the existing conditions at the signalized intersection without any improvements to SR 32.

Table 3: Traffic Analysis Results for SR 32 & Union Street								
Analysis Year	Scenario	Peak Hour	Parameter	Approach (SR 32 & Union Street)				
				NB	SB	EB	WB	Overall
2019	Existing	AM	LOS	E	E	B	D	D
			Delay (sec/veh)	62.6	72.6	19.8	50.6	44.0
			Queue Length (ft)	225	275	475	**975**	--
		PM	LOS	E	D	C	C	C
			Delay (sec/veh)	66.8	51.0	27.6	22.7	34.2
			Queue Length (ft)	300	200	**900**	550	--
2022 (Opening Year)	Existing	AM	LOS	E	E	C	**F**	**E**
			Delay (sec/veh)	61.7	75.8	24.5	**81.0**	**59.0**
			Queue Length (ft)	225	300	500	**1,000**	--
		PM	LOS	E	D	C	C	D
			Delay (sec/veh)	74.1	54.9	32.8	26.1	38.5
			Queue Length (ft)	375	250	**1,100**	625	--
2042 (Design Year)	Existing	AM	LOS	**F**	**F**	D	**F**	**F**
			Delay (sec/veh)	**111.5**	**140.9**	39.9	**109.1**	**89.4**
			Queue Length (ft)	**375**	**475**	650	**1,475**	--
		PM	LOS	**F**	D	**F**	D	**E**
			Delay (sec/veh)	**86.7**	53.3	**82.1**	38.5	**65.8**
			Queue Length (ft)	**450**	250	**1,375**	**875**	--

Based on the capacity analysis results, the SR 32 & Union Street intersection is expected to operate at LOS D in the 2019 AM peak hour and LOS C in the 2019 PM peak hour; however, the 95th percentile queue length exceeds 950-feet for the westbound approach in the AM peak hour and 900-feet for the eastbound approach in the PM peak hour. Due to the extensive queuing on SR 32 at Union Street, traffic flow is impeded at other driveways and major intersections along the corridor. In particular, the Poplar Street/Shamrock Boulevard roundabout is negatively impacted when slowed or stopped vehicles on SR 32 create a gridlock and prevent other vehicles from entering the roundabout. Slowed/stopped traffic through a roundabout compromises the safety of the intersection as driver expectations change and typical gaps in traffic are no longer available.

By the projected Opening Year (2022) of the project, new developments in the vicinity of downtown Westfield are anticipated to occur. The developments are anticipated to increase traffic volumes on SR 32 through the study corridor, which is expected to worsen the aforementioned conditions. The expected overall LOS of the SR 32 & Union Street intersection projected for the Opening Year of 2022 under existing conditions is LOS E in the AM peak hour and LOS D in the PM peak hour. The traffic analysis indicates several movements at the SR 32 & Union Street intersection will operate at LOS E or worse, and the queue lengths exceed 1,000-feet for the respective peak directions. This results in vehicle congestion that backs up to just west of East Street for westbound traffic during the AM peak hour, and congestion that occurs in the exit leg of the Poplar Street roundabout for eastbound traffic during the PM peak hour.

By the Design Year (2042) of the project, the overall LOS of the SR 32 & Union Street intersection under existing conditions is expected to be LOS F in the AM peak hour and LOS E for the PM peak hour. The analysis indicates multiple approaches for the intersection operate at LOS F in the AM and PM peak hours. For the AM peak hour, three out of four approaches are operating at a LOS F with the westbound movement having a queue length of 1,475-feet. This queue length would cause vehicle congestion that backs up almost to Hillcrest Drive. The PM peak hour has two out of four approaches operating at a LOS F with the eastbound approach having a queue length of 1,375-feet. This queue length would cause vehicle congestion that backs up into the Poplar Street roundabout.

Table 4 below summarizes the capacity analysis results (LOS, vehicle delay, and 95th percentile queue length) for the SR 32 & East Street intersection. The analysis was completed for the existing conditions at the one-way stop-controlled intersection without any improvements to SR 32.

Table 4: Traffic Analysis Results for SR 32 & East Street

Analysis Year	Scenario	Peak Hour	Parameter	Approach (SR 32 & East Street)				
				NB	SB	EB	WB	Overall
2019	Existing	AM	LOS		D	A	A	A
			Delay (sec/veh)		32.5	0.9	0.0	1.8
			Queue Length (ft)		50	0	0	--
		PM	LOS		**E**	A	A	A
			Delay (sec/veh)		**40.2**	0.2	1.0	1.0
			Queue Length (ft)		**25**	0	0	--
2022 (Opening Year)	Existing	AM	LOS		**E**	A	A	A
			Delay (sec/veh)		**42.2**	0.9	0.0	2.2
			Queue Length (ft)		**50**	0	0	--
		PM	LOS		**F**	A	A	A
			Delay (sec/veh)		**63.4**	0.2	0.0	1.6
			Queue Length (ft)		**50**	0	0	--
2042 (Design Year)	Existing	AM	LOS		**F**	A	A	A
			Delay (sec/veh)		**121.7**	1.1	0.0	5.7
			Queue Length (ft)		**125**	25	0	--
		PM	LOS		**F**	A	A	A
			Delay (sec/veh)		**239.2**	0.3	0.0	5.6
			Queue Length (ft)		**125**	0	0	--

Based on the capacity analysis results, the intersection of SR 32 & East Street under existing conditions is expected to operate at overall LOS A during the 2019 AM and PM peak hours; however, the southbound movement is operating at LOS D in the AM peak hour and LOS E during the PM peak hour. Southbound traffic approaching the SR 32 & East Street intersection is delayed when attempting to turn onto SR 32 due to congestion on SR 32 that does not provide a gap in traffic for turns, as well as can block the intersection preventing any turns.

By the projected Opening Year (2022) of the project, the southbound movement of the SR 32 & East Street intersection under existing conditions is expected to operate at LOS E during the AM peak hour and LOS F during the PM peak hour. The additional traffic volume along SR 32 decreases the opportunity for turn movements from East Street onto SR 32. The additional congestion affecting queue lengths causes vehicles on SR 32 to back up to just west of East Street in the AM peak hour. This causes additional delay in vehicles turning from East Street.

By the Design Year (2042) of the project, the southbound movement of the SR 32 & East Street intersection under existing conditions is expected to operate at LOS F in the AM and PM peak hours. In the AM peak hour, each vehicle is delayed by over two minutes when attempting to make a turning movement onto SR 32. In the PM peak hour, this delay doubles and each vehicle is delayed by over four minutes when attempting to make a turning movement onto SR 32.

1.3 Anticipated Future Growth

Recently, Westfield has been undergoing a revitalization effort that has increased tourism and economic development. In 2014 the Grand Park Sports Complex opened in Westfield, which is an over 400-acre sports campus that welcomes 2.5 million visitors per year. This has spurred over 1.5 billion dollars in economic development for Westfield. Grand Park Sports Complex has additional undeveloped properties available for future development that will further promote additional growth. The increased tourism and economic development has significantly increased transportation demands overall in Westfield.

Additionally, there are currently several planned developments and improvement projects in downtown Westfield that are in various stages of completion. These projects are the Grand Junction Park and Plaza, Union Square at Grand Junction, and the Jersey Street Extension. Each of the projects are generally located in the vicinity of the SR 32 corridor through downtown Westfield, but are independent of the SR 32 Westfield Reconstruction project (**Figure 2, Appendix B**). These projects are anticipated to further increase existing traffic congestion issues, as well as significantly change the existing conditions of the SR 32 corridor as these projects develop.

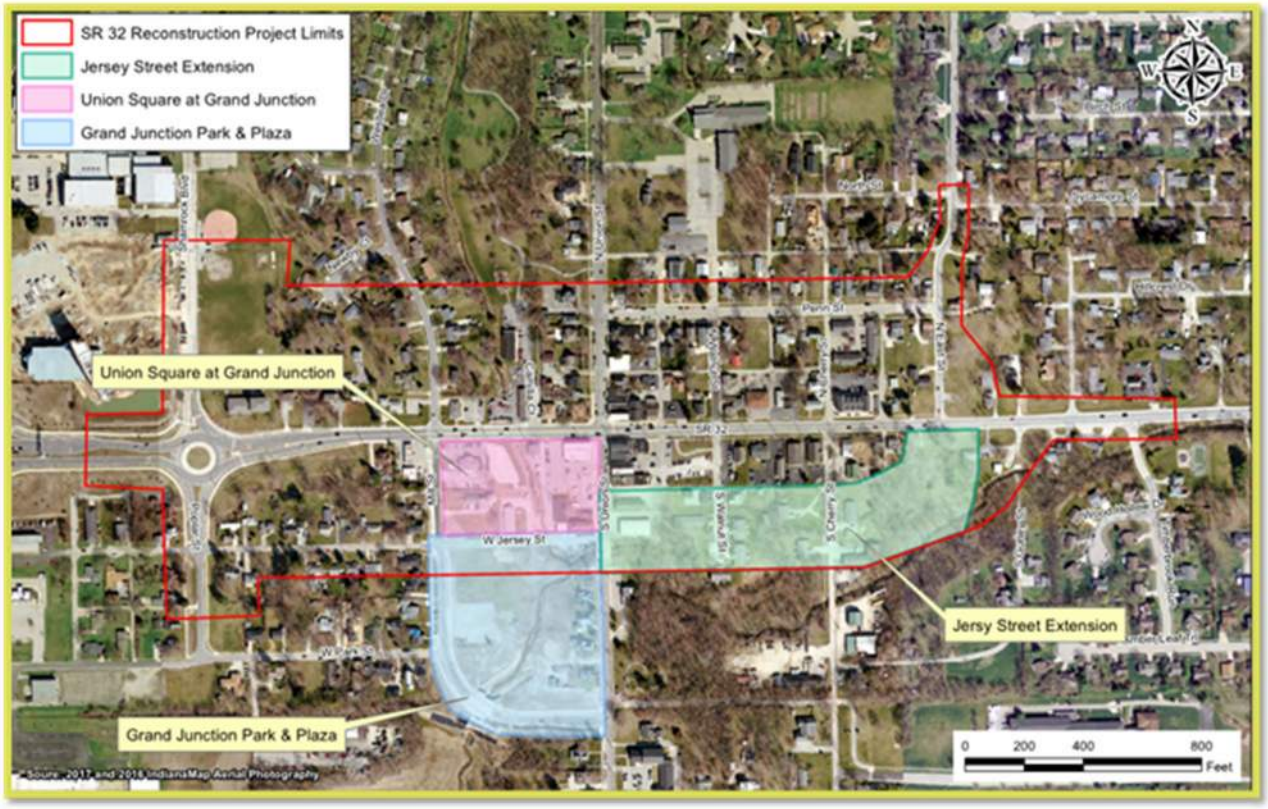

Figure 2: Planned Developments

1.3.1 Grand Junction Park and Plaza

The Grand Junction Park and Plaza is a 6-acre park located one block south of SR 32 that is currently under construction. The park is bounded by Jersey Street, Mill Street, and Union Street. The park is planned to include an outdoor performance venue, café, children's play area, and a trailhead pavilion. In the northwest corner of the park is the Plaza, which will become a central gathering place for festivals, markets, and other events hosted by the city throughout the year. The portion of Jersey Street adjacent to the park, between Mill Street and Union Street, is incorporated into the park plan with intentions to close that portion of the street to act as a plaza for events. The park plan also includes landscaping on both sides of the street. Improvements to Jersey Street between Mill Street and Union Street were incorporated into the park construction plans and are currently underway. As part of the Jersey Street improvements, the crossing of Grassy Branch Creek will be replaced. The current culvert is reaching the end of its design life. The new structure will be in conflict with the Former Town Hall Building/Fire Station that sits on the northeast corner of Jersey and Union. The Former Town Hall Building/Fire Station is listed as a contributing resource to the NRHP listed Westfield Historic District. The Former Town Hall Building/Fire Station has been owned by the city since it was originally constructed. A portion of the building is currently being used for equipment storage, while the rest of the building has been unoccupied for over five years. Since the conception of the Grand Junction Park and Plaza in 2008, the Former Town Hall Building/Fire Station has been incorporated into the redevelopment plan, which was emphasized by the purchase of adjacent properties in 2011 and 2015. The Grand Junction Park and Plaza is funded by the City of Westfield and designed by Land Collective. The project was conceived in 2008 with preliminary engineering funding that started in 2015. The construction funding plan was approved in the spring of 2019 with park construction beginning in 2019. Grand Junction Park and Plaza is expected to be completed in 2021.

1.3.2 Union Square at Grand Junction (Old Town Design Group Development)

Old Town Design Group is developing a 25 million dollar mixed-use complex along the south side of SR 32 between Union Street and Mill Street and north of Grand Junction Park and Plaza. The development is intended to be named Union Square at Grand Junction and would include: apartments, condos, shops, and restaurants. At this time, Old Town Design Group is negotiating agreements to purchase properties within the block of the planned development. There are five parcels that are owned by the City of Westfield that are within the footprint of the planned development: one parcel grass lot at the northeast corner of Mill Street and Jersey Street, three parcels along Union Street that serve as parking lots, and one parcel that the Former Town Hall Building/Fire Station sits on. As part of the planned development, the City of Westfield would transition those parcels as part of a development agreement. The Former Town Hall Building/Fire Station and two of the other parcels were already part of redevelopment plans by the city for the Grand Junction Park and Plaza (referenced in **Section 1.3.1**). There is discussion between the City of Westfield and Old Town Design Group on the possibility of incorporating a public parking garage into the Union Square development as well. The Union Square at Grand Junction development is funded by Old Town Design Group. Discussions between Old Town Design Group and the City of Westfield began in 2017 with the development officially announced in the spring of 2019. Union Square at Grand Junction was expected to begin construction in 2019 with expected completion in 2021.

1.3.3 Jersey Street Extension

Jersey Street currently starts at Maple Street with one travel lane in each direction and continues east for 0.34 mile until it terminates at Union Street. The portion of Jersey Street from Mill Street to where it connects to Union Street is being improved under the Grand Junction Park and Plaza project. East Street is a north corridor leading out from downtown Westfield and where current traffic traveling through downtown becomes congested. Currently, vehicles must travel farther west along SR 32 from East Street to Union Street, a south corridor that connects to the residential streets south of SR 32. The purpose of the Jersey Street Extension project is to provide increased access and an alternative east/west travel corridor through the southern portion of downtown Westfield.

Jersey Street currently terminates at Union Street where the downtown commercial area, proposed Grand Junction Park and Plaza, and residential area meet. Immediately south of SR 32, the east-west mobility is limited; this results in traffic on Jersey Street being required to go north via intersecting roads to gain access to SR 32- typically the signalized Union Street intersection. Currently, local traffic must travel north to SR 32 to reach an east-west corridor that leads out of downtown. Once Grand Junction Park and Plaza is completed, traffic from the east and north, accessing the Plaza and other portions of the park, will travel through downtown Westfield along SR 32 before turning south in the direction of the park. The completion of Union Square at Grand Junction will also increase traffic through the area. The extension would provide increased direct access to the southern portion of downtown Westfield including Grand Junction Park and Plaza and residential houses. With this extension, the overall roadway connectivity is improved within the area. Traffic will also be drawn away from the congested portions of SR 32 by providing residents and park visitors a complete east/west corridor. This Jersey Street Extension is funded by the City of Westfield. The project was conceived in the spring of 2017 and the funding was approved in the fall of 2018. The Jersey Street extension is anticipated to begin construction in 2021 with anticipated completion in 2022.

1.4 Existing Conditions

This section of SR 32 within the project area is a principal arterial that runs east/west through downtown Westfield. The existing typical roadway section of SR 32 is two 12-foot wide travel lanes (one eastbound, one westbound) with on-street parking and 11-foot wide left turn lanes at the intersection with Union Street. Existing sidewalks along SR 32 vary between 4-foot wide to 15-foot wide sections with the widest at the intersection with Union Street. The sidewalks are separated from travel lanes by 6-inch curbs. The current speed limit on SR 32 is 30 miles per hour (mph). There are six intersecting roadways (Poplar, Mill, Union, Walnut, Cherry, and East) along SR 32 within the project limits. Based on observations of existing conditions, traffic congestion at the intersections of SR 32 with Union Street and with East Street are affecting traffic flow along SR 32 that is then resulting in issues at the other intersecting roadways.

The existing typical roadway section of Union Street is two 11-foot wide travel lanes (one southbound, one northbound) with on-street parking along the northbound lane and 11-foot wide left turn lanes in each direction. Existing sidewalks along Union Street vary between 4-foot to 14-foot wide sections with the widest at the intersection with SR 32. The sidewalks are separated from travel lanes by 6-inch curbs. The SR 32 and Union Street intersection is signalized with dedicated left-turn lanes provided on all approaches; however, the vehicular storage length provided is limited to only two to three vehicles (50-feet). The left-turn phasing at the signal was recently modified near the end of 2018 to provide protected-permissive left turns for all left-turn movements. Due to existing peak hour congestion along SR 32, most left turns onto SR 32 occur at Union Street. Left turn volumes at the adjacent unsignalized intersection are low during the peak hours, which indicates that gaps in traffic are not available and forces drivers to use Union Street.

The existing typical roadway section of East Street is two 10-foot wide travel lanes (one southbound, one northbound) with a 2-foot wide curb and gutter along the southbound lane and a 1-foot wide paved shoulder along the northbound lane. A 4-foot wide sidewalk exists along the southbound lane. East Street provides a major north corridor, in addition to Union Street, from downtown Westfield. The current speed limit on East Street is 20 mph, but has a reduced speed limit of 15 mph north of Penn Street through a tight S-curve. This S-curve is a substandard horizontal curve that has limited sight distances for those moving along SR 32 as well as eastbound drivers on Penn Street moving onto SR 32. The intersection of SR 32 and East Street has a one-way stop control for the southbound approach along East Street and no turn lanes are provided at any of the approaches. Currently, southbound traffic approaching the SR 32 and East Street intersection is delayed when attempting to turn onto SR 32 due to congestion throughout the SR 32 corridor. This also occurs at the other intersecting roadways along SR 32; however, as stated above the peak hour congestion along SR 32 forces drivers to use Union Street for turn movements onto SR 32.

2. Proposed Action

The proposed action (Alternative A) involves widening and reconstructing SR 32 from just east of the Poplar Street roundabout to just east of Timberbrook Run (**Figure 3, Appendix B**). Outside of the boundaries of the Westfield Historic District and the Stultz-Stanley House, the existing 2-lane section of SR 32 would be reconstructed to consist of four 11-foot wide travel lanes (two westbound, two eastbound), with a raised 13-foot wide median, curb and gutter, and 8-foot wide sidewalks separated by 6-foot wide grass buffers on both sides of the roadway. At the intersection of SR 32 with Westlea Drive/Mill Street the raised median would transition to an 11-foot wide protected left turn lane for eastbound traffic to access Westlea Drive to the north. An 11-foot wide dedicated right turn lane would be provided for eastbound traffic to access Mill Street. Along SR 32 left turns would be restricted to Westlea Drive/Mill Street and Union Street. This reconstruction would result in widening the roadway to the south by approximately 25-feet. Along SR 32 between Walnut Street and Cherry Street a crosswalk with a pedestrian refuge island is proposed to provide an alternative crossing option for pedestrians between Union Street and East Street.

Throughout the project area the existing overhead utilities along the south side of SR 32 will be relocated underground to be underneath the sidewalk. The existing overhead utilities consist of electrical transmission and distribution cables in addition to multiple communications cables and their associated wooden power poles. Each of the utilities will require adequate separation from each other so maintenance and repairs can occur when necessary. Typical minimum separation is 3 to 5-feet depending on individual utility requirements. In addition to requiring enough room to relocate facilities within the right of way, a minimum of 10-foot-by-10-foot wide areas would be required as a dedicated easement for above ground pad mounted equipment. Due to the area needed for utility relocation, an anticipated utility corridor that is 15-feet wide extending from the curb line is accounted for along the south side of SR 32.

In front of the Stultz-Stanley House, SR 32 would be shifted north by approximately 34-feet and the typical section of SR 32 would remain the same with the exception of no 6-foot wide grass buffer along the south side of the roadway separating the sidewalk from the roadway. Although the roadway would be shifted north, it would still need to be widened to the south. Due to the widening south, the sidewalk would conflict with the existing stairs and front yard of the Stultz-Stanley House. Due to a significant difference in elevation between the yard in front of the Stultz-Stanley House and the existing roadway, a retaining wall would be constructed in front of the house to stabilize the current yard and avoid compromising the structure. Due to the area needed to provide the 15-foot wide utility corridor, the top of the stairs and the edge of the retaining wall would be approximately 6-feet, 8-inches from the edge of the front porch steps to the house.

Within the boundaries of the Westfield Historic District, SR 32 would be reconstructed to consist of four 11-foot wide travel lanes, an 11-foot wide turn lane, a 2-foot wide raised center curb with 1-foot wide curb offset, curb and gutter, and 8-foot wide sidewalks separated by 6-foot wide buffers on both sides of the roadway. This would result in widening SR 32 to the south by approximately 25-feet.

The intersection of SR 32 and East Street will be reconstructed to a roundabout with four 11-foot wide travel lanes (two westbound, two eastbound) with 8-foot wide sidewalks separated by 6-foot wide grass buffers on all sides. This will provide an opportunity for U-turn movements at each end of the project area to compensate for the restricted left turns throughout the roadway. Pedestrian crosswalks and refuge islands will be constructed at each leg of the roundabout. East of the roundabout and extending to just east of Timberbrook Run, SR 32 would be reconstructed to consist of four 11-foot wide travel lanes (two westbound, two eastbound). The beginning of a southern leg of the roundabout will be constructed as a connection to the anticipated to be built Jersey Street Extension. North of the roundabout, East Street will be reconstructed to consist of two 11-foot wide travel lanes (one northbound, one southbound) with 6-foot wide sidewalks adjacent to the curb and gutter on the west side of the roadway. East Street will be realigned to provide the appropriate transition into the roundabout as well as straighten out the existing S-curve along East Street, north of Penn Street.

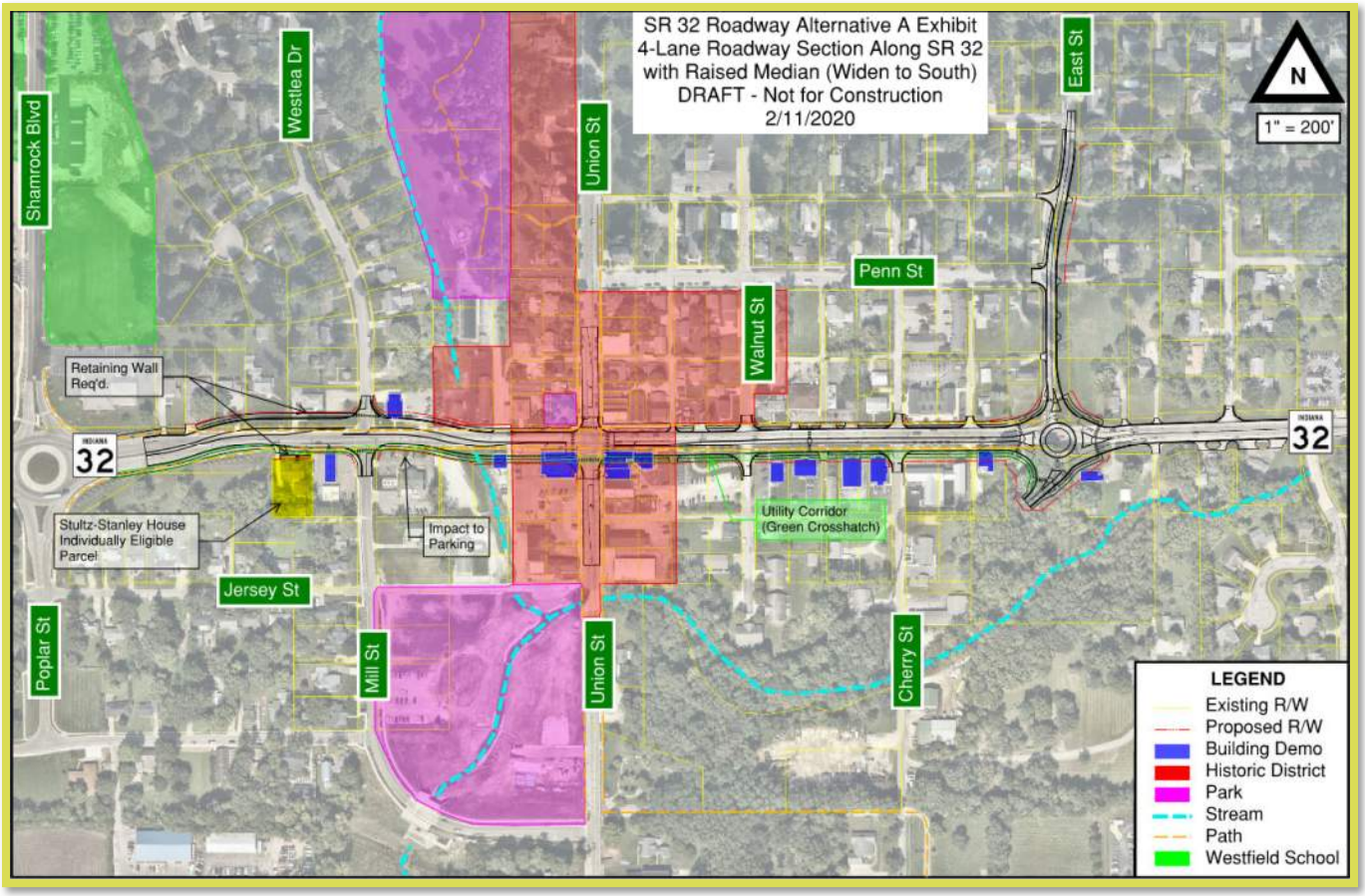

Figure 3: Alternative A (Proposed Action)

3. Other Alternatives

During project development with INDOT, the City of Westfield, and project stakeholders, two additional preliminary build alternatives (Alternatives B and C) were developed in addition to the proposed action (Alternative A). After public comment and further evaluation of eligible for listing or listed NRHP resources, an additional three build alternatives (Alternatives A-1, A-2, and A-3) were developed. Two alternatives (Alternatives D and E) were developed that would completely avoid downtown Westfield and the impacts to the area's resources. A total of eight alternatives were developed to be considered:

- Alternative A: Widen SR 32 (Proposed Action discussed in **Section 2**)
- Alternative A-1: Reduced Typical Section through Historic District and Closure of Union Street
- Alternative A-2: Widen SR 32 with Right-In/Right-Out At Union Street
- Alternative A-3: Widen SR 32 Avoidance of Stultz-Stanley House
- Alternative B: One-Way Pair SR 32 and Penn Street
- Alternative C: One-Way Pair SR 32 and Jersey Street
- Alternative D: Bypass
- Alternative E: No Build (Do-Nothing)

3.1. Alternatives Eliminated From Further Consideration

The alternatives developed were evaluated to determine if they meet the purpose and need of the project. If they did not meet the purpose and need, then they were eliminated from further consideration. Two alternatives, Alternative D and E, were determined to not meet the purpose and need and were eliminated from further consideration.

3.1.1 Alternative D: Bypass

This alternative would leave the existing SR 32 roadway as it currently exists. No reconstruction of the roadway to meet the project's purpose and need would be implemented. This alternative would turn over control of SR 32 to the City of Westfield and direct truck traffic onto local roads (for example, directing truck traffic to SR 38, SR 37, or I-69 depending on the intended direction of travel).

Currently, traffic is the most congested during the peak periods of weekdays (7:00 AM – 9:00 AM, 4:00 PM – 6:00 PM). Based on data from the traffic analysis, the percentage of truck traffic is approximately 2% during peak hours. Due to the small percentage of truck traffic, redirecting the truck traffic away from SR 32 would not address the overall traffic congestion issues during the peak hours. Additionally, in a letter dated July 15, 2019 (**Appendix D**) the City of Westfield stated that it is opposed to decommissioning SR 32 through the downtown area. The City has not budgeted for the long-term maintenance of the roadway, and relinquishment would burden taxpayers, as well as result in other vital infrastructure projects being delayed or cancelled to cover the long-term maintenance costs of the relinquishment of SR 32 through downtown Westfield.

A memo from the INDOT Corridor Development Office (**Appendix D**) states that an alternative that decommissions SR 32 and redirects truck traffic is not reasonable or feasible: According to the memo, *"…the interchange of US 31 and SR 32 forms a major connection point via the US 31 freeway to I-465 at the west end of the SR 32 corridor. Traffic data shows that US 31 at SR 32 is a destination point in addition to downtown Westfield itself. Of great significance is the fact that INDOT and FHWA invested millions of dollars into the US 31 Hamilton County freeway and the interchange at SR 32 to provide improved safety and traffic operations, access, connectivity and increased opportunities for economic development. Disallowing the traveling public from using SR 32 via a road transfer or any other means would call into question the prior investment and the environmental study on which the US 31 freeway was founded…Even if such an agreement were to be reached and truck traffic routed on another road, the high passenger car traffic volumes would still use the corridor as it is the shortest path to the US 31 freeway…*" Decommissioning SR 32 would not address the need of the project, to provide an efficient traveling environment for motorists or pedestrians, as the existing roadway is congested, nor does it address the purpose of the project, to improve corridor mobility along SR 32 through the downtown Westfield area for both motorists and pedestrians. Alternative D would not address any of the established needs of the project; therefore, it was eliminated from further consideration.

3.1.2 Alternative E: No Build (Do-Nothing)

This alternative would leave the existing SR 32 roadway as it currently exists. No reconstruction of the roadway to meet the project's purpose and need would be implemented. The existing roadway would continue to be congested further impeding traffic flow at numerous drives and intersection along the corridor.

The SR 32 & Union Street intersection under existing conditions is expected to operate at LOS F during the design year (2042) with 95 percentile queue lengths exceeding 1,350-feet in both directions along SR 32. The queuing on the eastbound approach specifically results in backups into the Poplar Street roundabout and impacts access to the Riverview Health Hospital and the Westfield Intermediate and Middle Schools. This would further decrease the corridor mobility through the project area. Alternative E would not address any of the established needs of the project; therefore, it was eliminated from further consideration, but is provided in the analysis for comparison between the build alternatives.

3.2. Alternative A-1: Reduced Typical Section through Historic District and Closure of Union Street

This alternative involves widening and reconstructing SR 32 from just east of the Poplar Street roundabout to just east of Timberbrook Run, as well as closing access to Union Street from SR 32 (**Figure 4, Appendix B**). This alternative would maintain the same typical section as Alternative A outside the limits of the Westfield Historic District. Within the

boundaries of the Westfield Historic District, SR 32 would be reconstructed to consist of four 11-foot wide travel lanes, curb and gutter, and 6-foot wide to 8-foot wide sidewalks on both sides of the roadway. The raised median and left turn lanes as proposed in Alternative A would be removed. At the intersection of SR 32 and Union Street, no access would be allowed to Union Street from SR 32. Vehicle access on Union Street would be terminated approximately 200-feet north and south of SR 32 at the nearby alleys where cul-de-sacs would be created to allow vehicle turn-arounds, as well as access for emergency vehicles. Instead of the current traffic signal at the intersection, a protected pedestrian crossing with signal would be installed. With the closure of Union Street access from SR 32, the typical section through the Westfield Historic District for this alternative is reduced to the minimum amount to facilitate the required traffic capacity and comply with acceptable design standards. This typical section, without accounting for the anticipated utility corridor, would be 8-feet wider than the existing roadway width in this area.

Due to the removal of access to Union Street, a major north/south roadway corridor leading in and out of downtown Westfield, the traffic volume would be redistributed to alternate routes through downtown Westfield. The redistributed traffic would result in congestion at the Poplar Street roundabout to the point in which the intersection would no longer provide an acceptable LOS. Therefore, extending Jersey Street from Union Street to East Street would be required in order for this alternative to be feasible. Jersey Street would be extended to connect to the East Street roundabout with a typical section consisting of two 11-foot wide lanes, curb and gutter, and 6-foot wide sidewalks adjacent to the curb and gutter on both sides of the roadway. Due to the redistributed traffic, Penn Street would be improved from Union Street to East Street. The existing pavement would be reconstructed to two 12-foot wide travel lanes and 8-foot wide on-street parking on both sides of the roadway. This reconstruction of Penn Street would remain within the existing width of pavement.

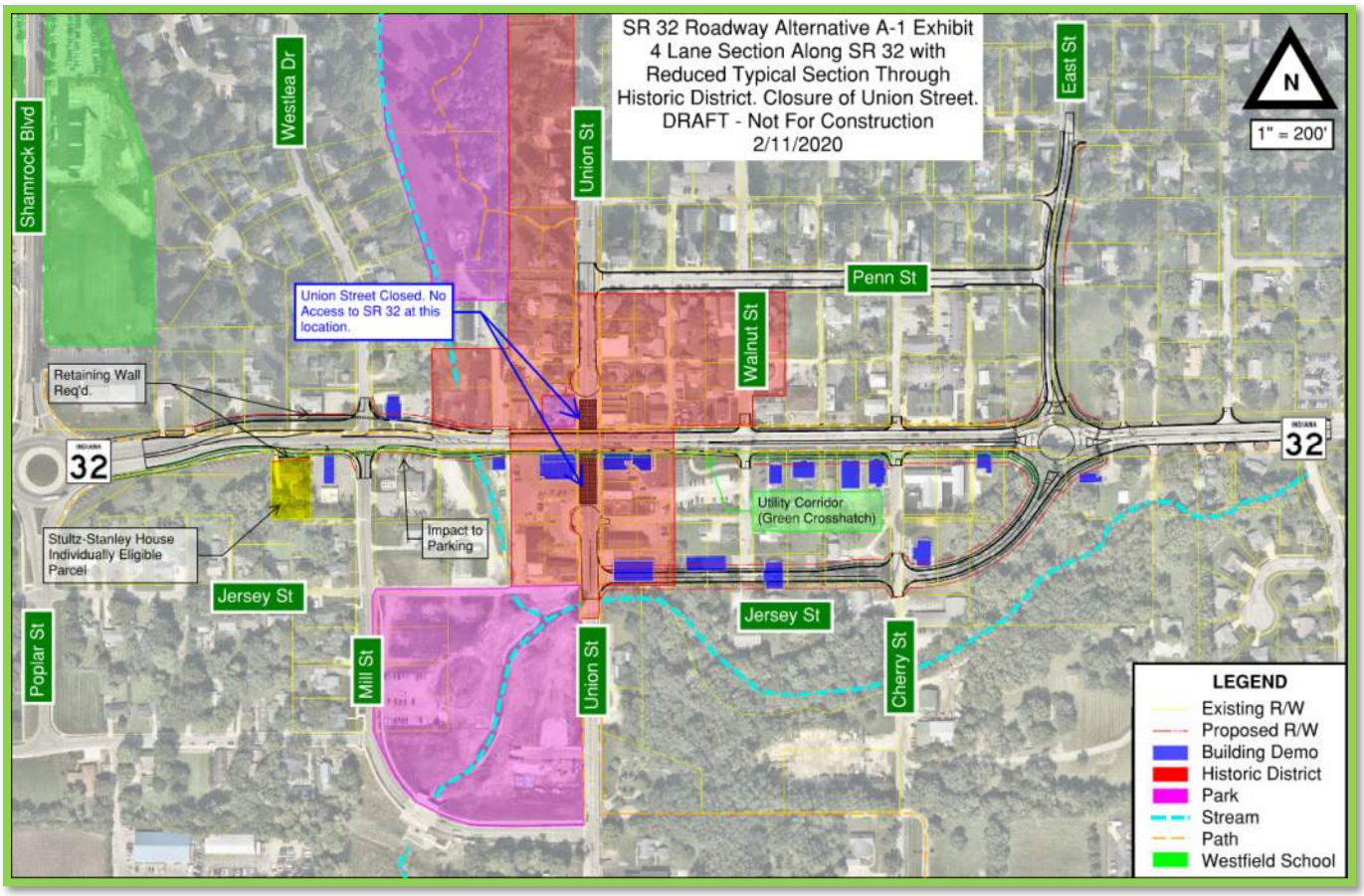

Figure 4: Alternative A-1

3.3. Alternative A-2: Widen SR 32 with Right-In/Right-Out At Union Street

In this alternative, outside of the Westfield Historic District the same typical section as Alternative A would be maintained. Inside the Westfield Historic District, access at SR 32 and Union Street would be restricted to a right-in/right-out (RIRO) only intersection (**Figure 5, Appendix B**). This allows for right turns on/off of SR 32 onto Union Street. With this configuration, all left turns at the intersection would be prohibited, and through movements along Union Street would also be prohibited. Within the boundaries of the Westfield Historic District, SR 32 would be reconstructed to consist of four 11-foot wide travel lanes with an 11-foot wide right turn lane for each direction, curb and gutter, and 8-foot wide sidewalks on both sides of the roadway separated by a 6-foot wide buffer against the curb and gutter. This would result in widening SR 32 south by 27-feet. This alternative was evaluated to attempt to reduce the typical section through the Westfield Historic District and minimize impacts.

The restricted access at SR 32 and Union Street would require local drivers to find alternate routes through downtown Westfield. The majority of redistributed traffic is expected to be pushed toward the existing Poplar Street roundabout or the proposed East Street roundabout at either end of the study corridor. Drivers would then utilize the minor roadway network to travel back to Union Street to continue to their destination. Based on the anticipated traffic volume redistribution, a heavy volume of eastbound and westbound right turns are expected to occur during the peak hours at SR 32 and Union Street. The right turn volume in both directions is high enough to warrant dedicated right turn lanes on SR 32.

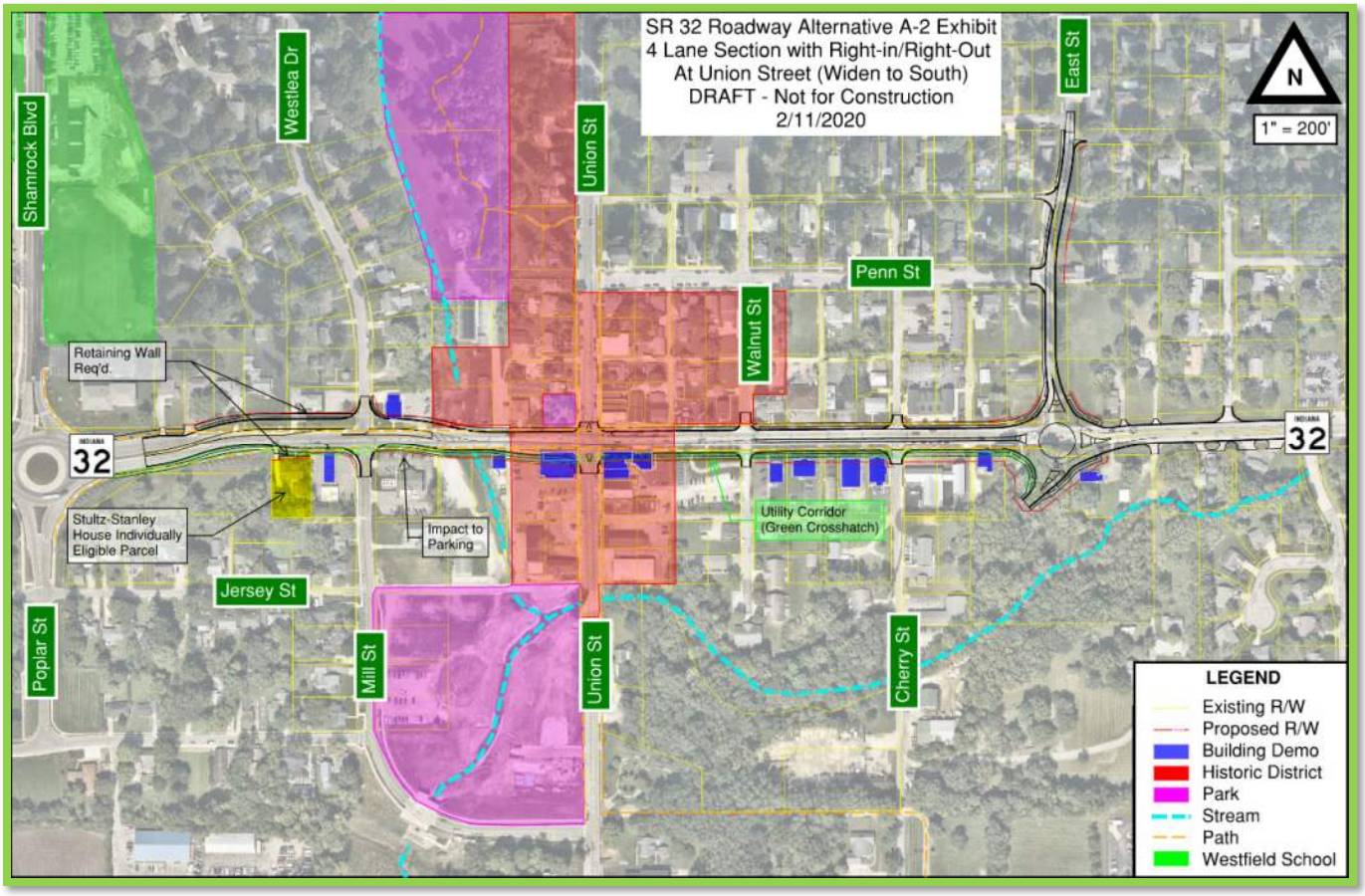

Figure 5: Alternative A-2

3.4. Alternative A-3: Widen SR 32 Avoidance of Stultz-Stanley House

This alternative involves widening and reconstructing SR 32 from just east of the Poplar Street roundabout to just east of Timberbrook Run, but shifts the alignment of SR 32 further north in front of the Stultz-Stanley House to avoid impacts

to the property (**Figure 6, Appendix B**). This alternative would maintain the same typical sections as Alternative A along SR 32 and East Street. In front of the Stultz-Stanley House, SR 32 would be shifted north by approximately 56-feet.

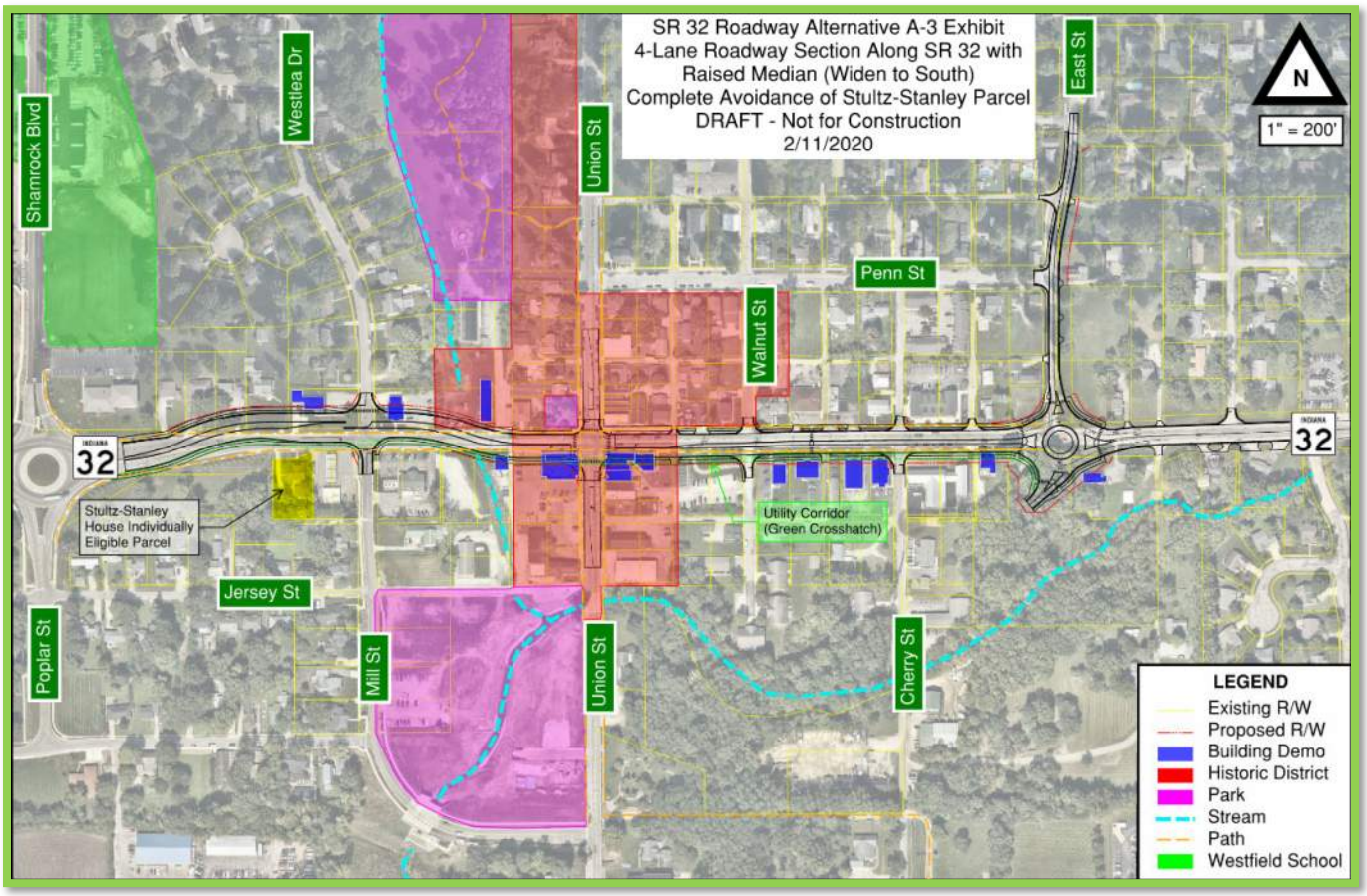

Figure 6: Alternative A-3

3.5. Alternative B: One-Way Pair SR 32 and Penn Street

In this alternative, SR 32 through downtown Westfield would be converted to a one-way pair utilizing SR 32 and Penn Street (**Figure 7, Appendix B**). SR 32 would be reconstructed to a one-way road carrying eastbound traffic while Penn Street would be reconstructed to a one-way road carrying westbound traffic. This reconstruction of Penn Street would include a new alignment of Penn Street beginning at Union Street and extending southwest to tie into the Poplar Street roundabout. Penn Street would be extended in the east partially along the existing East Street alignment to tie back into the existing SR 32. The current East Street intersection would be reconstructed to a roundabout where traffic flow splits onto the one-way pairs. East Street would then be reconstructed to tie into Penn Street (westbound SR 32), which would straighten the existing S-curve.

The typical section along eastbound SR 32 (existing SR 32 alignment) would consist of two 11-foot wide travel lanes, 7-foot wide on-street parking on both sides of the roadway, curb and gutter, and 8-foot wide sidewalks adjacent to the curb and gutter. At Westlea Drive/Mill Street, the roadway would widen and on-street parking along both sides of the road would transition to 11-foot wide left and right turn lanes that would transition back to on-street parking after the intersection. At Union Street the roadway would widen again and the on-street parking would transition to 11-foot wide left and right turn lanes. This would result in SR 32 being widened south by 8-feet.

The typical section along Penn Street (westbound SR 32) would consist of two 11-foot wide travel lanes, 7-feet of on-street parking on both sides of the roadway, curb and gutter, and 6-foot wide sidewalks adjacent to the curb and gutter.

West of Union Street, the typical section of SR 32 remains the same with the exception of no on-street parking. A traffic signal would be added at the intersection of Penn Street (westbound SR 32) and Union Street.

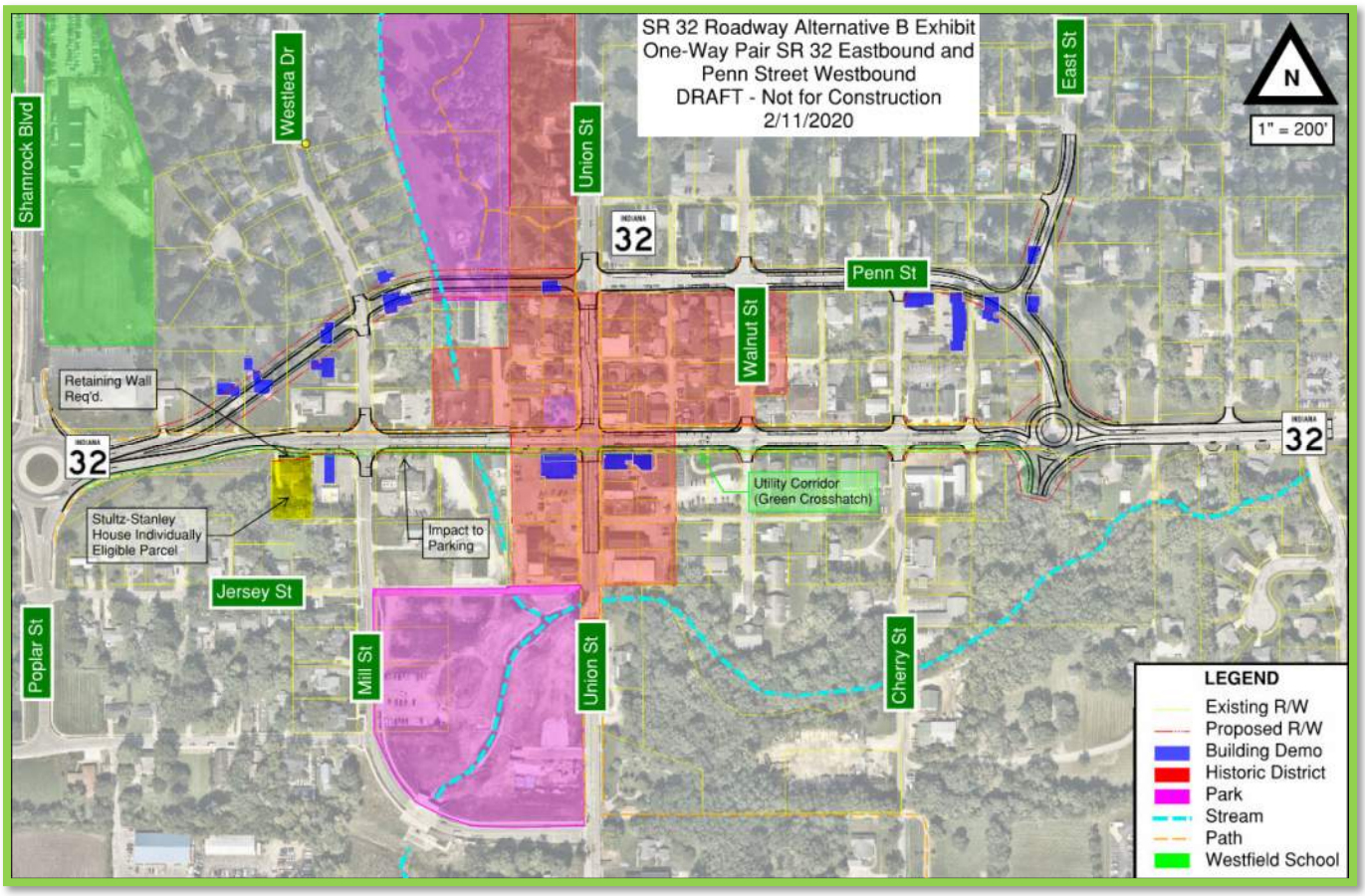

Figure 7: Alternative B

3.6. Alternative C: One-Way Pair SR 32 and Jersey Street

In this alternative, SR 32 through downtown Westfield would be converted to a one-way pair utilizing SR 32 and Jersey Street (**Figure 8, Appendix B**). SR 32 would be reconstructed to a one-way road carrying westbound traffic while Jersey Street would be reconstructed to a one-way road carrying eastbound traffic. This reconstruction of Jersey Street would include new alignment of Jersey Street between Poplar Street and Mill Street where Jersey Street would connect to the Poplar Street roundabout to tie back into the existing SR 32. Jersey Street would also include a new alignment between Union Street and East Street. The current East Street intersection would be reconstructed to a roundabout where the new Jersey Street alignment/eastbound SR 32 would tie back into the existing SR 32.

The typical section along westbound SR 32 (existing SR 32) would consist of two 11-foot wide travel lanes, 7-feet of on-street parking on both sides of the roadway, curb and gutter, and 8-foot wide sidewalks adjacent to the curb and gutter. At Westlea Drive/Mill Street, the roadway would widen and on-street parking along both sides of the road would transition to 11-foot wide left and right turn lanes that would transition back to on-street parking after the intersection. At Union Street the roadway would widen and the on-street parking would again transition to 11-foot wide left and right turn lanes. This would result in SR 32 being widened south by 8-feet.

The typical section along Jersey Street/eastbound SR 32 would consist of two 11-foot wide travel lanes, curb and gutter, and 6-foot wide sidewalks adjacent to the curb and gutter. At Union Street the roadway would widen to include 11-foot wide left and right turn lanes. At Cherry Street the roadway would widen to include an 11-foot wide left turn lane. A traffic signal would be added at the intersection of Jersey Street/eastbound SR 32 and Union Street.

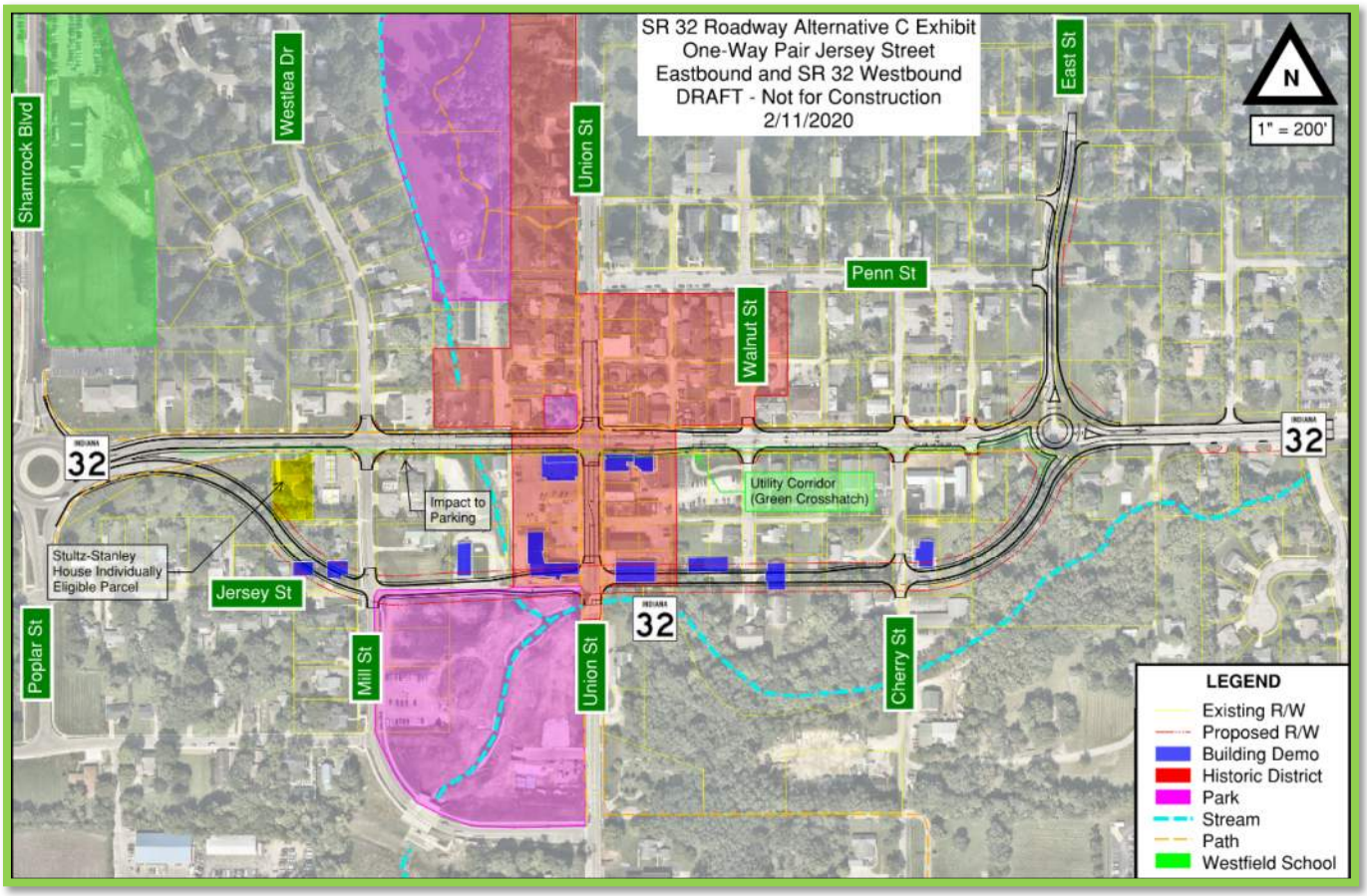

Figure 8: Alternative C

4. Analysis Evaluation Criteria

4.1 Historic Properties

As noted in **Section 1.1**, the Section 106 process was initiated for this project when it was anticipated the project would receive federal funding. Since the initiation of the Section 106 process, federal funding has been removed from the project, and funding of the project is now anticipated to be met through a combination of local and state funds. Due to receiving funding from the State of Indiana, the project is required to follow the IHPAA outlined in IC 14-21-1. The IHPAA requires a Certificate of Approval (COA) for any alteration, demolition, or removal of historic sites or structures listed on the Indiana Register of Historic Sites and Structures (IRHSS), and/or any properties listed on the NRHP.

4.1.1 Westfield Historic District (NR-2521)

The Westfield Historic District consists of an even mix of historic commercial and residential buildings that extend out from the intersection of Main Street (SR 32) and Union Street in downtown Westfield. The Westfield Historic District includes thirty-seven Contributing resources (thirty-six buildings and one structure) and fourteen Non-Contributing resources (thirteen buildings and on site). The period of significance ranges from circa 1850, the date of construction for the oldest building in the Westfield Historic District, to 1968. The District was listed in the NRHP in 2018 with significance in the areas of Commerce and Architecture (Criteria A and C).

4.1.2 Stultz-Stanley House

Based on recommendation of the Indiana SHPO, the Stultz-Stanley House at 209 West Main Street is also considered eligible for listing in the NRHP under Criterion C for its Craftsman architecture. The Indiana SHPO stated that "*The house has all the key traits of the bungalow type - it is a one-and-a-half story house with overhanging roof, exposed rafters, and a broad porch/sunroom across the Main Street elevation… The interior also reveals a twist on the Craftsman style: The homeowners elected to build their bungalow around an existing house. Family lore, and physical evidence, show that the house was originally a late Greek Revival/Italianate house that was oriented so that the current west elevation faced Main Street… Reuse of an existing house was not incompatible with the modern simplicity of the Craftsman movement…The general idea of saving and updating a house was part and parcel of the Craftsman era, including Central Indiana, and the Stultz-Stanley House is a solid example*."

Although the IHPPA does not require a COA for non-state owned properties that are determined to be eligible for listing on the NRHP, the effects to the Stultz-Stanley House will continue to be taken into consideration in this analysis.

4.2 Relocations

Potential relocations were identified based on preliminary designs of each alternative and the potential right-of-way and construction limits that would be required. This area took into account the need for grading and any required buffer zones. Relocations were identified if a structure would be impacted by potential construction activities. To account for multi-unit residential and commercial buildings within the project area, the number of units were also included.

4.3 Right-of-way

Potential right-of-way acquisition was based on preliminary designs of each alternative. The potential right-of-way acquisition took into account all aspects of the preliminary designs including sidewalks and buffers. The cost of the potential right-of-way acquisition was determined based on estimates provided by INDOT Right-of-Way Division and implemented in the total costs of the alternative.

4.4 Parks

Three parks are located within the project area: Asa Bales Park, Hadley Park, and Grand Junction Park and Plaza. These parks are defined below.

4.4.1 Asa Bales Park

Asa Bales Park is a 13.24-acre park partially within the project area that begins at the end of Camilla Court and extends north to Hoover Street. The park is located between Westfield Community School buildings and residential areas. The park is operated by the City of Westfield. There are two vehicle access points to the park with one being in the north from Hoover Street and one in the south from Camilla Court. Both entrances have parking lots for visitors. A paved trail runs from the northern parking lot down to the southern parking lot. The park also includes multiple shelters, a natural amphitheater, playground, and skate park.

4.4.2 Hadley Park

Hadley Park is a 0.15-acre park that is located at the northwest corner of SR 32 and Union Street within the project area. This park is accessible from the sidewalks along SR 32 and Union Street. The park consists of brick paved paths, flower gardens with trees, fencing along all sides, and benches for visitors.

4.4.3 Grand Junction Park and Plaza

The Grand Junction Park and Plaza is a 6-acre park located one block south of SR 32 that is currently under construction. Construction began on the park in 2019 with expected full completion in 2021. The park is bounded by Jersey Street, Mill Street, and Union Street. The park is planned to include an outdoor performance venue, café, children's play area, and a trailhead pavilion. In the northwest corner of the park is the Plaza, which will become a central gathering place for festivals, markets, and other events hosted by the city throughout the year. The portion

of Jersey Street adjacent to the park, between Mill Street and Union Street, is incorporated into the park boundaries and plan with intentions to temporarily close that portion of the street throughout the year to act as a plaza for events. The park plan also includes landscaping on both sides of the street. Improvements to Jersey Street between Mill Street and Union Street were incorporated into construction plans and are currently underway. Grand Junction Park and Plaza is further discussed in **Section 1.3.1** above.

4.5 Trails

Four trails are located within the project area: Asa Bales Park Trail, Grand Junction Trail, SR 32 Trail, and Union Street Trails. The location of the trails are defined below.

4.5.1 Asa Bales Park Trail

This trail is a paved trail through the middle of Asa Bales Park. The trail can be accessed at the end of Camilla Court where a parking lot exists for park and trail use. A fork of this trail splits just north of the parking lot to connect east to Union Street just north of Penn Street. This trail is part of larger bike paths throughout Westfield and Hamilton County.

4.5.2 Grand Junction Trail

This trail borders the east side of Grand Junction Park and Plaza along Union Street from South Street north to SR 32 and utilizes the existing sidewalk. This trail is part of the overall Grand Junction Park and Plaza development that includes a trailhead pavilion.

4.5.3 SR 32 Trail

This trail runs along SR 32 utilizing the existing sidewalk along the north and south side of the roadway. The north trail and south trail run parallel to each other through the project area. This trail provides connection to other trails throughout Westfield including the Asa Bales Park Trail and the Grand Junction Trail.

4.5.4 Union Street Trails

These trails run along Union Street utilizing the existing sidewalk along the west and east side of the roadway. The west trail begins in the northwest corner of SR 32 and Union Street extending north along Union Street out of the project area. The east trail extends along the east side of Union Street north and south of SR 32. This trail provides connection to other trails throughout Westfield including Asa Bales Park Trail and Grand Junction Trail.

Due to the trails location in the center of the project area, all of the trails will be temporarily impacted by the proposed alternatives. Therefore, this evaluation criterion is not a determining factor in the preferred alternative.

4.6 Level of Service (LOS)

The LOS for each alternative was sourced from the *Traffic Operations Analysis* discussed in **Section 1.2.1**. The definitions for LOS can also be found in **Section 1.2.1.**

4.7 Stream crossings

Two streams, Grassy Branch Creek and the J.M. Thompson Drain, flow through the project area. Grassy Branch Creek flows east to west through the project area and runs parallel to SR 32 until it flows under Union Street, south of SR 32, where it enters Grand Junction Park and Plaza. J. M. Thompson Drain flows through the project area from north to south and under SR 32 west of Union Street before its confluence with Grassy Branch Creek in Grand Junction Park and Plaza.

4.8 Average Travel Time Benefits

Average travel time benefit was determined by evaluating the time it takes motorists to travel along SR 32 from where they enter the project area to their destination, which is then compared to the time it would take them to travel the same route in the No Build Alternative. The average travel time benefit also took into consideration the traffic

congestion in the corridor and those alternatives that require traffic to be routed along a different street. The average travel time benefit then can be compared across alternatives to determine the impact to the motorists traveling along the project area.

4.9 Roadway miles shifted from Westfield to INDOT

Due to two of the alternatives involving rerouting SR 32 onto local streets maintained by the City of Westfield, the amount of roadway miles that would then need to be relinquished from the City of Westfield to INDOT was accounted for in the evaluation criteria.

4.10 Construction costs

Total cost of each alternative was determined by combining the estimated cost of potential right-of-way acquisition and the estimated construction costs. Construction costs were estimated based on construction taking place during 2022 with an estimated 4.5% inflation and includes reimbursable utility relocation cost, as well as a 30% contingency. The cost of the potential right-of-way acquisition was determined based on estimates provided by INDOT Right-of-Way Division and implemented in the total costs of the alternatives.

5. Analysis of Alternatives

The evaluation criteria listed in **Section 4** was assessed for each of the alternatives and can be seen in **Table 5** below, as well as in **Appendix A**. The evaluation criteria for Alternative A is summarized below. Alternatives A-1 through C are summarized and compared to Alternative A, the proposed action.

5.1 Alternative A: Widen SR 32

This alternative addresses the project's purpose and need. The existing extensive queuing and congestion are both addressed through the addition of the travel lanes and the roundabout at East Street. This alternative improves corridor mobility along SR 32 by reducing the potential for traffic flow to backup into the Poplar Street Boulevard roundabout and from impeding numerous drives and intersecting roads along the roadway. Based on the *Traffic Operations Analysis* prepared (**Appendix C**), this alternative would function at an acceptable level of service (LOS D or better) in the design year. Alternative A fully satisfies the projects purpose and need.

This alternative would result in an impact to the Westfield Historic District. As a result of the proposed widening for the added travel lanes and turn lanes required to accommodate existing and projected traffic, the project would remove six buildings within the Westfield Historic District (101 S Union Street, 102 S Union Street, 103 S Union Street, 104 S Union Street, 108 S Union Street, and 111 E Main Street). All six buildings are identified as contributing resources to the Westfield Historic District. Overall, the project would acquire a total of 0.28-acre of right-of-way from the Westfield Historic District. Widening SR 32 to the north through the Westfield Historic District (or a combination of north and south) was evaluated and it was determined that it would result in a larger impact by requiring the removal of at least five additional contributing buildings to the Westfield Historic District, as well as impacts to Hadley Park. Alternative A relocates the same number of buildings in the Westfield Historic District at Alternatives A-1, A-2, and B, while Alternatives A-3 and C have one additional building relocation.

Additionally, this alternative would result in an impact to the Stultz-Stanley House. The project would acquire 0.016 acre of right-of-way from the house, as well as construct a retaining wall in front of the house to stabilize the yard and avoid compromising the structure. The impact to the Stultz-Stanley house under Alternative A is the same impact as Alternatives A-1, A-2, C, and B.

Alternative A, along with Alternative A-3, has an average travel time benefit at 3.3-minutes faster than the No Build Alternative, which is the highest average travel time benefit amount. Only two other alternatives, Alternatives B and C, have a positive average travel time benefit. Alternative A has the second lowest proposed right-of-way acquisition

amount at 2.25-acres, which is slightly more (0.13-acre more) than the alternative with the lowest proposed right-of-way acquisition, Alternative A-2. In addition to the removal of six buildings in the Westfield Historic District, Alternative A would result in one residential building (1-unit) and eight commercial buildings (9-units) being relocated. Alternative A-2 has the same amount of relocations, while Alternative A-3 has an additional building removed from the Westfield Historic District. This is the lowest amount of residential buildings relocated by the proposed alternatives. Alternative A has the second lowest total cost at an estimated $15,527,400, which is 3% higher than the lowest total cost alternative, Alternative A-2.

5.2 Alternative A-1: Reduced Typical Section through Historic District and Closure of Union Street

This alternative addresses the project's purpose and need. The existing extensive queuing and congestion are both addressed along SR 32 by preventing traffic flow from backing up into the Poplar Street Boulevard roundabout and from impeding numerous drives and intersecting roads along the roadway. Based on the *Traffic Operations Analysis* prepared (**Appendix C**), this alternative would function at an acceptable level of service (LOS D or better) in the design year. However, the average travel time per driver would be 2-minutes slower than the existing conditions (No Build Alternative) due to the rerouting of traffic from the lack of Union Street access. When comparing the average travel time per driver to Alternative A, this alternative would be 4.4-minutes slower per driver. This time delay would impact emergency vehicles moving through downtown Westfield. Alternative A-1 does not reduce impacts to the Westfield Historic District or the Stultz-Stanley House compared to Alternative A. This alternative would cause relocations of an additional two residential buildings (6-units) and one additional commercial building (1-unit) compared to Alternative A. Approximately 3.27-acres of permanent right-of-way would be acquired due to the required extension of Jersey Street, which is the highest amount of right-of-way acquisition compared to all the alternatives. Project costs associated with Alternative A-1 are an estimated $7 million dollars more than Alternative A and is the most expensive of all alternatives due to the increased impacts to residences, a commercial business, and additional right-of-way.

5.3 Alternative A-2: Widen SR 32 with Right-In/Right-Out At Union Street

This alternative addresses the project's purpose and need. The existing extensive queuing and congestion are both addressed through the addition of the travel lanes and the roundabout at East Street. This improves the corridor mobility along SR 32 by preventing traffic flow from backing up into the Poplar Street Boulevard roundabout and from impeding numerous drives and intersecting roads along the roadway. Based on the *Traffic Operations Analysis* prepared (**Appendix C**), this alternative would function at an acceptable level of service (LOS D or better) in the design year. However, this alternative would have an overall LOS D and is the lowest LOS of all the alternatives. This alternative would have an average travel time per driver that would be 1-minute slower than the existing conditions (No Build Alternative) due to the rerouting of traffic from the reduced Union Street access. When comparing the average travel time per driver to Alternative A, this alternative would be almost 4.5-minutes slower per driver. This time delay would impact emergency vehicles moving through downtown Westfield. Alternative A-2 does not reduce the amount of relocations within the Westfield Historic District nor does it reduce impacts to the Stultz-Stanley House when compared to Alternatives A, A-1, and B. This alternative would have the same impacts to commercial and residential buildings/units as Alternative A and would acquire approximately 0.13-acre less right-of-way than Alternative A. Project costs associated with Alternative A-2 are estimated to be approximately $477,000 dollars less than Alternative A, but this would result in only a 3% reduction in the project costs.

5.4 Alternative A-3: Widen SR 32 Avoidance of Stultz-Stanley House

This alternative addresses the project's purpose and need. The existing extensive queuing and congestion are both addressed through the addition of the travel lanes and the roundabout at East Street. This improves the corridor mobility along SR 32 by preventing traffic flow from backing up into the Poplar Street Boulevard roundabout and from impeding numerous drives and intersecting roads along the roadway. Based on the *Traffic Operations Analysis* prepared

(**Appendix C**), this alternative would function at an acceptable level of service (LOS D or better) in the design year. Alternative A-3 avoids impacts to the Stultz-Stanley House; however, this alternative increases the impact to the Westfield Historic District by removing an additional building that is a contributing resource compared to Alternatives A, A-1, and A-2. Overall, this alternative would acquire a total of 0.35-acre of right-of-way from the Westfield Historic District, which is the greatest amount of right-of-way of all the alternatives.

5.5 Alternative B: One-Way Pair SR 32 and Penn Street

This alternative addresses the project's purpose and need. The existing extensive queuing and congestion are both addressed through the conversion to a one-way pair and the roundabout at East Street. This improves the corridor mobility for vehicles through downtown Westfield by preventing traffic flow from backing up into the Poplar Street Boulevard roundabout and from impeding numerous drives and intersecting roads along the roadway, but does not specifically improve the mobility along the existing SR 32 corridor through downtown Westfield. The rerouting of a state road through the residential area located north of downtown disrupts the community cohesion of the residential area by separating existing residences south of the proposed westbound SR 32 alignment from the rest of the residential area to the north. This would also introduce a high traffic road directly adjacent to those residences along both sides of the proposed alignment. Additionally, pedestrians crossing Penn Street would be crossing a high traffic state road compared to currently crossing a less traveled residential street, which would decrease how efficiently the pedestrians can move through the area. Based on the *Traffic Operations Analysis* prepared (**Appendix C**), this alternative would function at an acceptable level of service (LOS D or better) in the design year. However, Alternative B does not reduce the amount of impacts to the Westfield Historic District or the Stultz-Stanley House compared to Alternatives A, A-1, and A-2. This alternative would impact Asa Bales Park and would acquire 0.24-acres of right-of-way from the park. This would impact the southern entrance to the park and remove approximately half of the available parking for the park. Alternative B and Alternative C are the only alternatives that would result in impacts to local parks. A total of ten residential buildings (17-units) would be impacted by this alternative. This alternative would require the most relocations of residential units than any other alternative; an additional 16-units compared to Alternative A. Overall, there would be seventeen buildings (24-units) when accounting for the one commercial relocation and the six buildings removed from the Westfield Historic District in this alternative. Project costs associated with Alternative B are an estimated $2.5 million dollars more than Alternative A, which is an almost 16% increase in project costs.

5.6 Alternative C: One-Way Pair SR 32 and Jersey Street

This alternative addresses the project's purpose and need. The existing extensive queuing and congestion are both addressed through the conversion to a one-way pair and the roundabout at East Street. This improves the corridor mobility for vehicles through downtown Westfield by preventing traffic flow from backing up into the Poplar Street Boulevard roundabout and from impeding numerous drives and intersecting roads along the roadway, but does not specifically improve the mobility along the existing SR 32 corridor through downtown Westfield. The rerouting of a state road through the residential area located south of downtown disrupts the community cohesion of the residential area by separating existing residences north of the proposed eastbound SR 32 alignment from the rest of the residential area to the south. This would also introduce a high traffic road directly adjacent to those residences along both sides of the proposed alignment. Additionally, pedestrians crossing Jersey Street would be crossing a high traffic state road compared to currently crossing a less traveled residential street, which would decrease how efficiently the pedestrians can move through the area. It is anticipated that the amount of pedestrians in the area of Jersey Street will increase significantly with the completion of Grand Junction Park and Plaza. Based on the *Traffic Operations Analysis* prepared (**Appendix C**), this alternative would function at an acceptable level of service (LOS D or better) in the design year. However, Alternative C increases the amount of impacts to the Westfield Historic District compared to Alternatives A, A-1, A-2, and B. It does remove the impact of a retaining wall at the Stultz-Stanley House, but still acquires 0.022-acre of right-of-way from the southwest corner of the property. This alternative would have impacts to Grand Junction Park and Plaza that would result in acquiring 0.34-acre of right-of-way and affecting the use of Jersey Street as part of the park. In addition to six buildings removed from the Westfield Historic District, four residential buildings (8-units) and

two commercial buildings (2-units) would be relocated. This is the second highest total of residential relocations out of all the alternatives and has an additional 6-units that are relocated compared to Alternatives A, A-2, and A-3. Project costs associated with Alternative C is an estimated $6.2 million dollars more than Alternative A, which is a 40% increase in project costs. This is the second most expensive alternative just behind Alternative A-1.

Table 5: Evaluation Matrix

SR 32 Westfield Reconstruction (Des. No. 1801731) - Evaluation Matrix								
Evaluation Criteria		Alternatives						
		No Build	A	A-1	A-2	A-3	B[2]	C
			4 Lane Section along SR 32 with Raised Median (Widen to South)	4 Lane Section Along SR 32 with Reduced Typical Section Through Historic District. Closure of Union Street	4 Lane Section Along SR 32 with Right-In/Right-Out At Union Street (Widen to South)	4 Lane Section along SR 32 with Raised Median (Widen to South) Complete Avoidance of Stultz-Stanley	One-Way Pair: SR 32 Eastbound & Penn St. Westbound	One-Way Pair: Jersey St. Eastbound & SR 32 Westbound
Does the Project Meet Purpose and Need? (Y/N)		N	Y	Y	Y	Y	Y	Y
Anticipated Relocations	Westfield Historic District (Removal)	0	6 Buildings (6 Units)	6 Buildings (6 Units)	6 Buildings (6 Units)	7 Buildings (7 Units)	6 Buildings (6 Units)	7 Buildings (7 Units)
	Residential	0	1 Building (1 Unit)	3 Buildings (7 Units)	1 Building (1 Unit)	1 Building (1 Unit)	10 Buildings (17 Units)	4 Buildings (8 Units)
	Commercial	0	8 Buildings (9 Units)	9 Buildings (10 Units)	8 Buildings (9 Units)	8 Buildings (9 Units)	1 Building (1 Unit)	2 Buildings (2 Units)
	Total	**0**	**15 Buildings (16 Units)**	**18 Buildings (23 Units)**	**15 Buildings (16 Units)**	**16 Buildings (17 Units)**	**17 Buildings (24 Units)**	**13 Buildings (17 Units)**
Anticipated Permanent Right-of-Way	Westfield Historic District	0.00	0.28	0.20	0.23	0.35	0.16	0.34
	Stultz-Stanley House	0.00	0.016	0.016	0.016	0	0.016	0.022
	Residential Acreage	0.00	0.92	1.52	0.96	1.01	1.93	2.17
	Commercial Acreage	0.00	1.04	1.54	0.91	1.13	0.19	0.72
	Total Acreage	**0.00**	**2.25**	**3.27**	**2.12**	**2.49**	**2.30**	**3.26**
Park Impacts (Acreage)		0	0	0	0	0	0.24 (1 Park)	0.34 (1 Park)
Trail Impacts		0	4	4	4	4	4	4
Traffic Level of Service (Design Year 2042)		LOS F	LOS C	LOS C	LOS D	LOS C	LOS C	LOS C
Stream Crossings		N/A	1	1	1	1	2	2
Average Travel Time Benefits (Minutes Per Driver)		0	3.3 Minutes Faster	2.0 Minutes Slower	1.1 Minutes Slower	3.3 Minutes Faster	3.2 Minutes Faster	3.0 Minutes Faster
Roadway Miles Shifted from Westfield to INDOT		0.00	0.00	0.00	0.00	0.00	0.21	0.11
Roadway Project Length (Total Miles)		0.00	0.72	0.91	0.72	0.72	1.15	1.20
Total Cost (Construction + Right-of-Way) (2022)[1]		$0	$15,527,400	$22,524,200	$15,050,300	$16,246,600	$17,980,100	$21,618,700

Notes:

[1] Construction costs are estimated to Construction Year 2022 with an estimated 4.5% inflation and include reimbursable utility relocation cost and a 30% contingency. Estimated Right of Way Cost is based on estimates provided by INDOT Right-of-Way Division.

[2] Alternative B requires relocation of Multi-Family Housing facility (13 Units)

6. Selection of Preferred Alternative

The analysis of the evaluation criteria in **Section 5** did not result in an alternative with the fewest impacts across all criteria. Analysis of the evaluation criteria between alternatives in **Section 5** reveals that the proposed action, (Alternative A) has the second lowest total cost, which accounts for the potential right-of-way cost and the cost of construction. Alternative A only relocates a single residential unit and does not disrupt the community cohesion of the existing residential areas. Alternative A does not introduce a high traffic roadway adjacent to residential houses nor does it decrease the efficiency of pedestrians moving through the residential area. Alternative A has a high average travel time benefit due to the reduction in traffic congestion, as well as allows motorists to take a more direct route along SR 32. Alternative A avoids impacting the existing local parks and the future plans for the community's use of those parks. Alternative A minimizes the impact to the Stultz-Stanley house through the use of a retaining wall and has no more impacts to the Westfield Historic District than any other alternative. Alternative A best addressed the purpose and need of the project while balancing the impacts in the project area. Therefore, Alternative A has been determined to be the preferred alternative.

Appendix A

SR 32 Westfield Reconstruction (Des. No. 1801731) - Evaluation Matrix

Evaluation Criteria		Alternatives						
		No Build	A 4 Lane Section along SR 32 with Raised Median (Widen to South)	A-1 4 Lane Section Along SR 32 with Reduced Typical Section Through Historic District. Closure of Union Street	A-2 4 Lane Section Along SR 32 with Right-In/Right-Out At Union Street (Widen to South)	A-3 4 Lane Section along SR 32 with Raised Median (Widen to South) Complete Avoidance of Stultz-Stanley	B[2] One-Way Pair: SR 32 Eastbound & Penn St. Westbound	C One-Way Pair: Jersey St. Eastbound & SR 32 Westbound
Does the Project Meet Purpose and Need? (Y/N)		N	Y	Y	Y	Y	Y	Y
Anticipated Relocations	**Westfield Historic District (Removal)**	0	6 Buildings (6 Units)	6 Buildings (6 Units)	6 Buildings (6 Units)	7 Buildings (7 Units)	6 Buildings (6 Units)	7 Buildings (7 Units)
	Residential	0	1 Building (1 Unit)	3 Buildings (7 Units)	1 Building (1 Unit)	1 Building (1 Unit)	10 Buildings (17 Units)	4 Buildings (8 Units)
	Commercial	0	8 Buildings (9 Units)	9 Buildings (10 Units)	8 Buildings (9 Units)	8 Buildings (9 Units)	1 Building (1 Unit)	2 Buildings (2 Units)
	Total	**0**	**15 Buildings (16 Units)**	**18 Buildings (23 Units)**	**15 Buildings (16 Units)**	**16 Buildings (17 Units)**	**17 Buildings (24 Units)**	**13 Buildings (17 Units)**
Anticipated Permanent Right-of-Way	**Westfield Historic District**	0.00	0.28	0.20	0.23	0.35	0.16	0.34
	Stultz-Stanley House	0.00	0.016	0.016	0.016	0	0.016	0.022
	Residential Acreage	0.00	0.92	1.52	0.96	1.01	1.93	2.17
	Commercial Acreage	0.00	1.04	1.54	0.91	1.13	0.19	0.72
	Total Acreage	**0.00**	**2.25**	**3.27**	**2.12**	**2.49**	**2.30**	**3.26**
Park Impacts (Acreage)		0	0	0	0	0	0.24 (1 Park)	0.34 (1 Park)
Trail Impacts		0	4	4	4	4	4	4
Traffic Level of Service (Design Year 2042)		**LOS F**	LOS C	LOS C	LOS D	LOS C	LOS C	LOS C
Stream Crossings		N/A	1	1	1	1	2	2
Average Travel Time Benefits (Minutes Per Driver)		0	**3.3 Minutes Faster**	**2.0 Minutes Slower**	**1.1 Minutes Slower**	**3.3 Minutes Faster**	**3.2 Minutes Faster**	**3.0 Minutes Faster**
Roadway Miles Shifted from Westfield to INDOT		0.00	0.00	0.00	0.00	0.00	0.21	0.11
Roadway Project Length (Total Miles)		0.00	0.72	0.91	0.72	0.72	1.15	1.20
Total Cost (Construction + Right-of-Way) (2022)[1]		$0	$15,527,400	$22,524,200	$15,050,300	$16,246,600	$17,980,100	$21,618,700

Notes:

[1] Construction costs are estimated to Construction Year 2022 with an estimated 4.5% inflation and include reimbursable utility relocation cost and a 30% contingency. Estimated Right of Way Cost is based on estimates provided by INDOT Right-of-Way Division.

[2] Alternative B requires relocation of Multi-Family Housing facility (13 Units)

Appendix B

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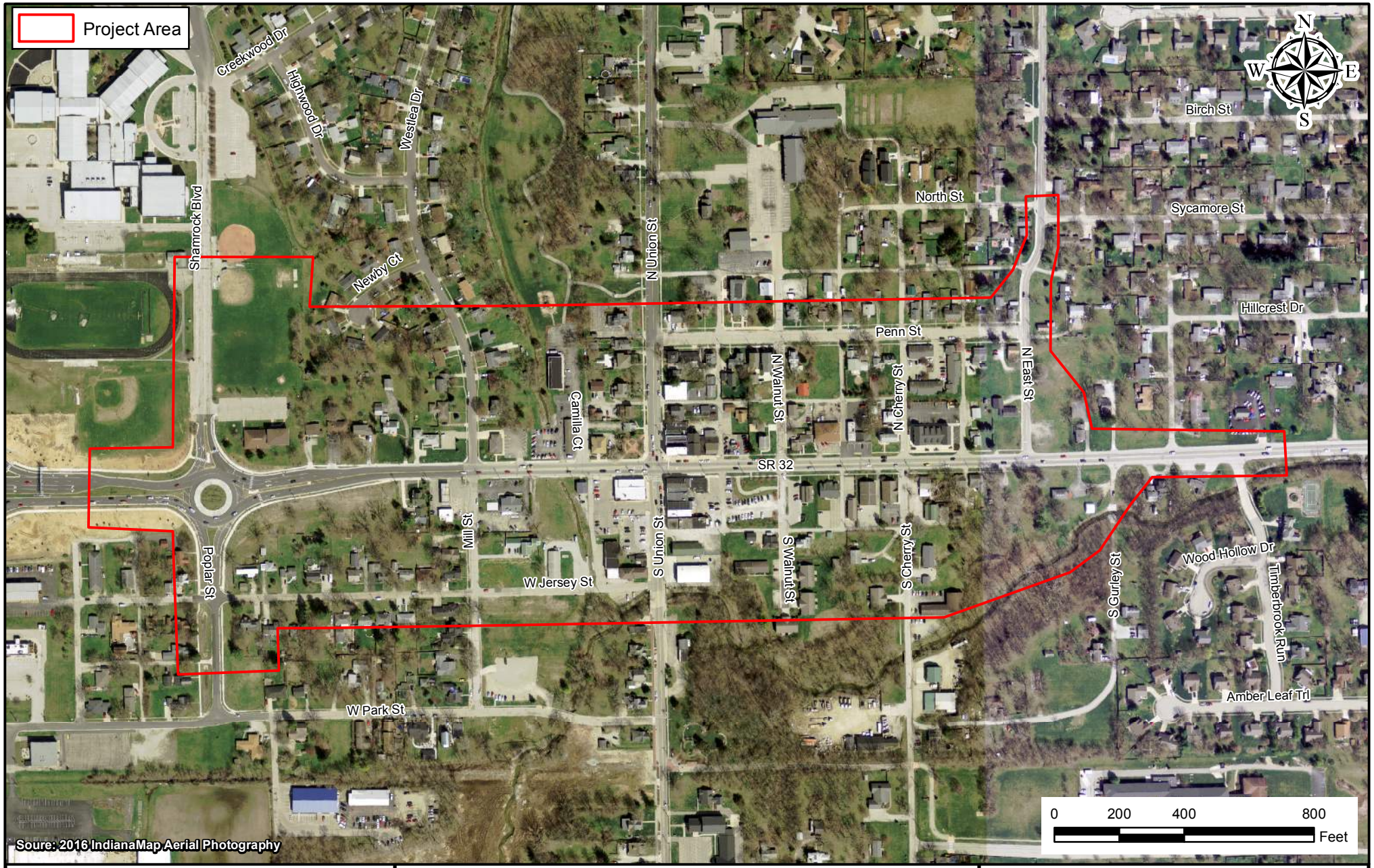

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Figure 1: Project Area

City of Westfield
2728 E 171st Street
Westfield, IN 46074

SR 32 Reconstruction
Des. No. 1801731

Location: Westfield
Township: Washington
County: Hamilton
State: Indiana

Date: 04/26/2019

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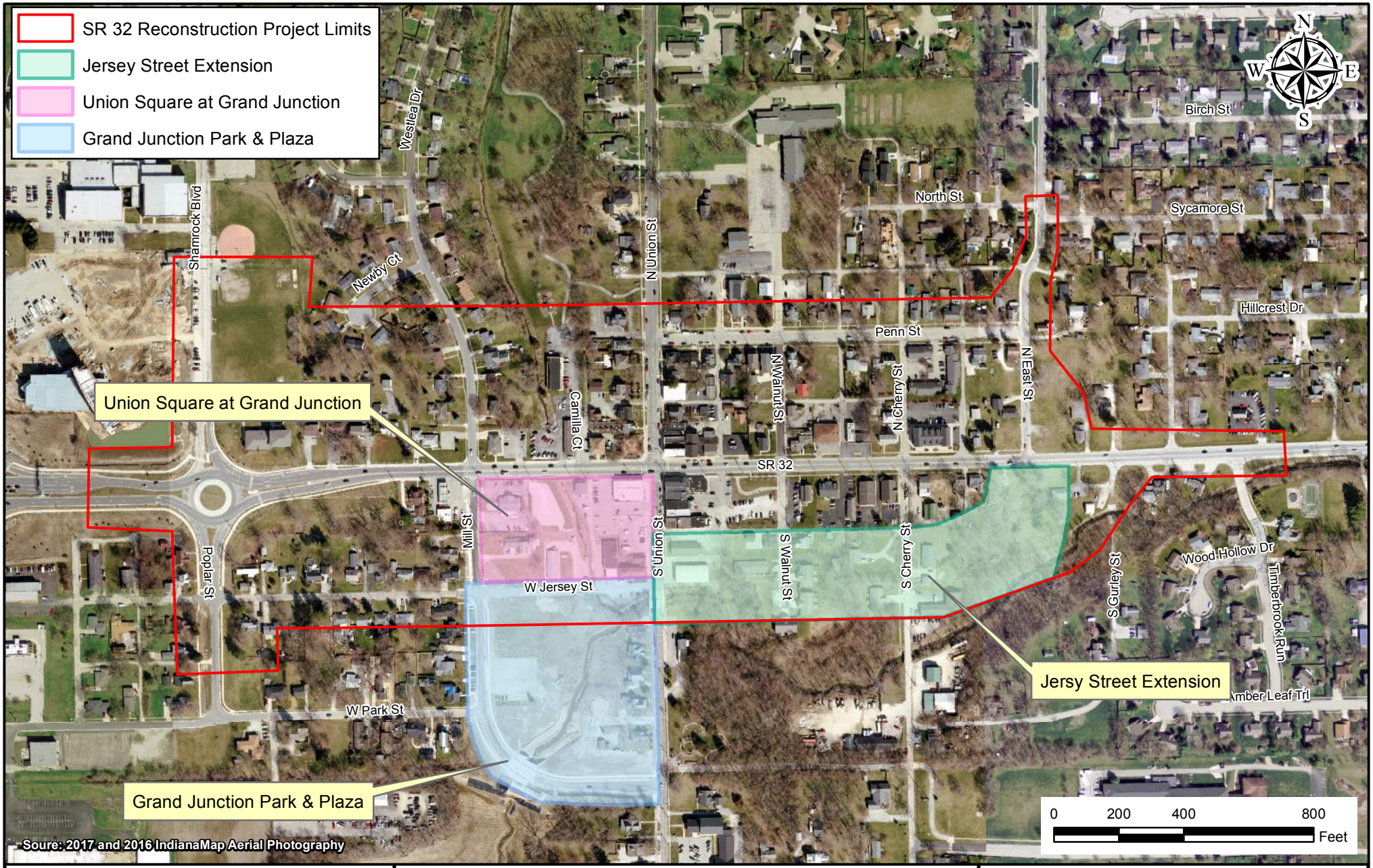

AMERICAN STRUCTUREPOINT INC.

Figure 2: Westfield Developments

City of Westfield
2728 E 171st Street
Westfield, IN 46074

SR 32 Reconstruction
Des. No. 1801731

Location: Westfield
Township: Washington
County: Hamilton
State: Indiana

Date: 07/23/2019

SR 32 Roadway Alternative A Exhibit
4-Lane Roadway Section Along SR 32 with Raised Median (Widen to South)
DRAFT - Not for Construction
2/11/2020

N

1" = 200'

Shamrock Blvd
Westlea Dr
Union St
East St
Penn St
Walnut St
Retaining Wall Req'd.
INDIANA 32
Stultz-Stanley House Individually Eligible Parcel
Impact to Parking
Utility Corridor (Green Crosshatch)
Jersey St
Poplar St
Mill St
Union St
Cherry St

LEGEND

- Existing R/W
- Proposed R/W
- Building Demo
- Historic District
- Park
- Stream
- Path
- Westfield School

SR 32 Roadway Alternative A-1 Exhibit
4 Lane Section Along SR 32 with Reduced Typical Section Through Historic District. Closure of Union Street.
DRAFT - Not For Construction
2/11/2020

N

1" = 200'

Shamrock Blvd

Westlea Dr

Union St

East St

Penn St

Walnut St

Union Street Closed. No Access to SR 32 at this location.

Retaining Wall Req'd.

INDIANA 32

Stultz-Stanley House Individually Eligible Parcel

Impact to Parking

Utility Corridor (Green Crosshatch)

Jersey St

Poplar St

Mill St

Union St

Jersey St

Cherry St

INDIANA 32

LEGEND

- Existing R/W
- Proposed R/W
- Building Demo
- Historic District
- Park
- Stream
- Path
- Westfield School

SR 32 Roadway Alternative A-2 Exhibit
4 Lane Section with Right-in/Right-Out
At Union Street (Widen to South)
DRAFT - Not for Construction
2/11/2020

N

1" = 200'

Shamrock Blvd

Westlea Dr

Union St

East St

Penn St

Walnut St

Retaining Wall Req'd.

INDIANA 32

Stultz-Stanley House Individually Eligible Parcel

Impact to Parking

Utility Corridor (Green Crosshatch)

Jersey St

Poplar St

Mill St

Union St

Cherry St

LEGEND

- Existing R/W
- Proposed R/W
- Building Demo
- Historic District
- Park
- Stream
- Path
- Westfield School

SR 32 Roadway Alternative A-3 Exhibit
4-Lane Roadway Section Along SR 32 with Raised Median (Widen to South)
Complete Avoidance of Stultz-Stanley Parcel
DRAFT - Not for Construction
2/11/2020

N

1" = 200'

Shamrock Blvd
Westlea Dr
Union St
East St
Penn St
Walnut St
INDIANA 32
INDIANA 32
Stultz-Stanley House Individually Eligible Parcel
Utility Corridor (Green Crosshatch)
Jersey St
Poplar St
Mill St
Union St
Cherry St

LEGEND

- Existing R/W
- Proposed R/W
- Building Demo
- Historic District
- Park
- Stream
- Path
- Westfield School

SR 32 Roadway Alternative B Exhibit
One-Way Pair SR 32 Eastbound and Penn Street Westbound
DRAFT - Not for Construction
2/11/2020

N

1" = 200'

Shamrock Blvd
Westlea Dr
Union St
East St
Penn St
Walnut St
Jersey St
Poplar St
Mill St
Cherry St
INDIANA 32

Retaining Wall Req'd.

Stultz-Stanley House Individually Eligible Parcel

Impact to Parking

Utility Corridor (Green Crosshatch)

LEGEND

- Existing R/W
- Proposed R/W
- Building Demo
- Historic District
- Park
- Stream
- Path
- Westfield School

SR 32 Roadway Alternative C Exhibit
One-Way Pair Jersey Street Eastbound and SR 32 Westbound
DRAFT - Not for Construction
2/11/2020

N

1" = 200'

Shamrock Blvd

Westlea Dr

Union St

East St

Penn St

Walnut St

INDIANA 32

INDIANA 32

INDIANA 32

Impact to Parking

Utility Corridor (Green Crosshatch)

Stultz-Stanley House Individually Eligible Parcel

Jersey St

Poplar St

Mill St

Union St

Cherry St

LEGEND

- Existing R/W
- Proposed R/W
- Building Demo
- Historic District
- Park
- Stream
- Path
- Westfield School

Appendix C

Traffic Operations Analysis

SR 32 Westfield Reconstruction

Prepared for:

Indiana Department of Transportation (INDOT)
City of Westfield, Indiana

May 30, 2019

AMERICAN STRUCTUREPOINT INC.

7260 SHADELAND STATION
INDIANAPOLIS, INDIANA 46256
317.547.5580

www.structurepoint.com

Traffic Operations Analysis

SR 32 Westfield Reconstruction

US 31 to East Street
City of Westfield, Indiana

May 30, 2019

I certify that this TRAFFIC IMPACT STUDY has been prepared by me or under my immediate supervision and that I have experience and training in the field of traffic and transportation engineering.

5/30/2019

Patrick M. O'Connor, PE, PTOE

Indiana Registration #PE11600579

5/30/2019

Gannon M. Grimmer, PE

Indiana Registration #PE11700838

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www.structurepoint.com

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Executive Summary

Study Purpose and Scope

The purpose of this Traffic Operations Analysis (TOA) is to evaluate the future year conditions for the proposed widening of SR 32 in Westfield, IN. The study consists of three (3) roadway alignment alternatives and will determine the required cross-sections and intersection geometrics for each alternative. The traffic analysis also accounts for anticipated redevelopment on SR 32 near Union Street and potential future development on SR 32 west of US 31.

Traffic Forecast

Traffic has been forecasted by first collecting base year (2019) traffic volumes, then applying an annual linear background traffic growth rate of 1.0% per year to obtain Opening Year 2022 and Design Year 2042 no-build (background) traffic volumes. Additionally, background developments anticipated to be completed prior to the Opening Year 2022 west of US 31 were included in the no-build analysis. New site trips generated by the anticipated future redevelopment along SR 32 in downtown Westfield were added to the background volumes to project Opening Year 2022 and Design Year 2042 build traffic volumes.

Traffic Signal Warrant Analysis

A traffic signal warrant analysis was completed for the following intersections:

- Penn Street & Union Street (Alternative B) [Met]
- Jersey Street & Union Street (Alternative C) [Met]

Capacity Analysis

The capacity analysis for the signalized and stop control intersections was performed using Synchro (Version 9.2). The capacity analysis for the roundabout intersections was performed using SIDRA (Version 8). The operating conditions of intersections were considered to be acceptable if found to operate at LOS D or better for the overall intersection, with no approach operating worse than LOS E. Capacity improvements are identified for the locations not meeting the criteria. Improvements were also recommended if the 95th percentile queue lengths were determined to have an adverse impact on corridor traffic operations.

Findings and Recommendations

Based on capacity analysis and field observations of the existing conditions, SR 32 in downtown Westfield is known to experience congestion during the 2019 AM and PM peak hours. The Synchro analysis has shown that the 95th percentile queue length at SR 32 & Union Street exceeds 950 feet for the westbound approach in the AM and 900 feet for the eastbound approach in the PM. Due to the extensive queuing on SR 32 at Union Street, traffic flow is impeded at other driveways and major intersections along the corridor. In particular, the Poplar Street/Shamrock Boulevard roundabout is negatively impacted when slowed or stopped vehicles on SR 32 create a gridlock and prevent other vehicles from entering the roundabout. Slowed/stopped traffic through a roundabout compromises the safety of the intersection as drivers expectations change and typical gaps in traffic are no longer available. Since the north leg of the roundabout provides access to Riverview Health and the Westfield Intermediate and Middle Schools, safety at the roundabout is of the utmost concern.

By the projected Opening Year (2022) of the project, development is expected to be in place along SR 32 west of US 31. The development is anticipated to increase traffic volumes on SR 32 in downtown Westfield, which is expected to worsen the aforementioned conditions. During the Opening Year 2022 (Scenario 2) AM and PM peak hours, the Synchro analysis shows that several movements will operate at LOS F and the 95th percentile queue lengths exceed 1,000 feet for the respective peak directions. Widening of SR 32 will be required in order to mitigate the congestion issues.

Based upon the analysis of the design alternatives and the recommended geometrics, all alternatives are anticipated to operate within the level of service, delay, and queue standards established at the outset of this study for Design Year 2042 Build (Scenario 5). These findings will be included in further studies and analysis which are anticipated to analyze the full impacts of these scenarios.

The 4-lane design alternative with access management (Scenario 5A) is anticipated to result in fewer stops during both the AM and PM peak scenarios when compared to the one-way pair options (Scenarios 5B and 5C) based on the Synchro network performance measures. In general, the results indicate that all three design alternatives are anticipated to result in improved operations along SR 32. The two one-way pair options are anticipated to improve the conditions as compared to the no-build scenario, with neither option being superior.

1.0 Study Purpose and Scope

1.1 Purpose

The purpose of this Traffic Operations Analysis (TOA) is to evaluate the future year conditions for the proposed widening of SR 32 in Westfield, IN. The study consists of three (3) roadway alignment alternatives and will determine the required cross-sections and intersection geometrics for each alternative. The limits of the traffic analysis along SR 32 are bounded by the US 31 interchange and East Street to the west and the east, respectively. The study area is shown on **Figure 1.1**. The traffic analysis also accounts for anticipated redevelopment on SR 32 near Union Street and potential future development on SR 32 west of US 31.

1.2 Scope

The traffic analysis focuses on 11 intersections along SR 32 or in close proximity to the roadway, including a proposed extension of Jersey Street from Union Street to East Street. The study intersections are listed below in **Table 1.1**.

Table 1.1 – Study Intersections

No.	Intersection
1	SR 32 & US 31
2	SR 32 & Poplar Street / Shamrock Boulevard
3	SR 32 & Mill Street / Westlea Drive
4	SR 32 & Union Street
5	SR 32 & Walnut Street
6	SR 32 & Cherry Street
7	SR 32 & East Street
8	Penn Street & East Street
9	Penn Street & Union Street
10	Jersey Street & Union Street
11	Jersey Street (future) & Cherry Street

A capacity analysis was performed for the scenarios listed in **Table 1.2**. The study scenarios focus on traffic volumes for the Existing Year 2019, an Opening Year 2022, and a Design Year 2042. The SR 32 design alternatives that were evaluated are shown in **Table 1.3**.

Table 1.2 – Study Scenarios

Scenario	Traffic Volumes	Description
1	Existing Year 2019	No-Build*
2	Opening Year 2022	No-Build*
3	Opening Year 2022	Build
4	Design Year 2042	No-Build*
5	Design Year 2042	Build

**No-Build assumes no changes to existing SR 32 with only background growth*

Table 1.3 – SR 32 Design Alternatives

Alternative	Roadway Network
A	SR 32 4-Lane Section (with Access Management)
B	One-Way Pair (SR 32 EB, Penn Street WB)
C	One-Way Pair (SR 32 WB, Jersey Street EB)

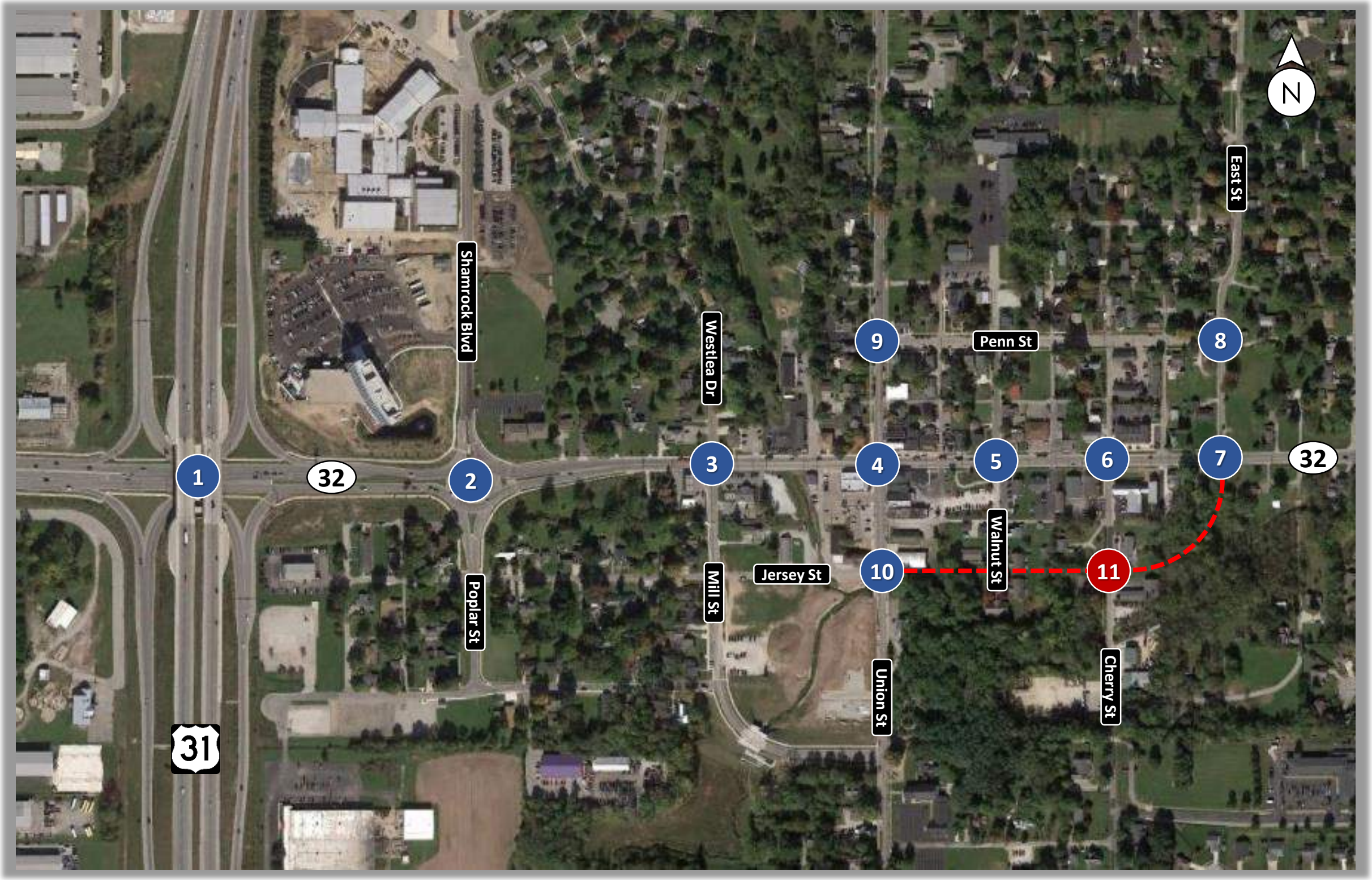
A traffic signal warrant analysis was conducted for the following intersections based on the guidelines provided in the *Indiana Manual on Uniform Traffic Control Devices (MUTCD)*:

- Penn Street & Union Street (Alternative B)
- Jersey Street & Union Street (Alternative C)

A turn lane warrant analysis was conducted for the following intersections based on the guidelines provided in the *Indiana Design Manual*:

- SR 32 & Mill Street / Westlea Drive
- SR 32 & Walnut Street
- SR 32 & Cherry Street

All analysis results and recommendations have been summarized and documented in this Traffic Operations Analysis.



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Legend

1 Intersection Number (Existing)

1 Intersection Number (Future)

Jersey Street Future Extension

SR 32 Reconstruction
Westfield, IN

Figure 1.1
Study Area

2.0 Background Information

The following sections document the current and proposed roadway conditions of the streets within the study area. The existing lane configurations and traffic control types are shown on **Figure 2.1**.

2.1.1 SR 32

SR 32 is an east/west roadway that is currently classified as a Principal Arterial in the vicinity of the study area. Through the study segment, SR 32 generally consists of a two-lane section that widens at major intersections to provide dedicated left-turn lanes. The posted speed limit on SR 32 is 30 mph. On-street parking is currently allowed between Mill Street and East Street.

2.1.2 US 31

US 31 is a north/south highway that is currently classified as a Principal Arterial. The US 31 & SR 32 single-point urban interchange serves as a major access point to downtown Westfield. The interchange currently has excess capacity and is not expected to require any improvements as part of the SR 32 widening project.

2.1.3 Poplar Street / Shamrock Boulevard

The intersection of SR 32 & Poplar Street / Shamrock Boulevard operates as a multi-lane roundabout with dedicated right-turn lanes on all approaches with the exception of eastbound. Poplar Street (south leg) is classified as a Minor Collector that provides access to residential and commercial land use areas. A Poplar Street extension is anticipated to be constructed in the future to provide connectivity south to 161st Street. Shamrock Boulevard (north leg) is classified as a Local Road that provides access to Riverview Health, Westfield Intermediate School, and Westfield Middle School.

2.1.4 Mill Street / Westlea Drive

The intersection of SR 32 & Mill Street / Westlea Drive is two-way stop control, and no turn lanes are provided at any of the approaches.

2.1.5 Union Street

Union Street is a north/south roadway that is currently classified as a Major Collector. Union Street is one of Westfield's most highly-traveled roads and goes through the downtown core area. The intersection of SR 32 & Union Street is signalized with dedicated left-turn lanes provided on all approaches; however, the storage provided is limited to only 2-3 vehicles (50'). The left-turn phasing at the signal was recently modified near the end of 2018 to provide protected-permissive left turns for all left-turn movements.

Due to the existing peak hour congestion along SR 32, most left turns onto SR 32 occur at Union Street. Left-turn volumes at the adjacent unsignalized intersections are low during the peak hours, which indicates that gaps in traffic are not available and forces drivers to use Union Street. The posted speed limit on Union Street is 20 mph.

2.1.6 Walnut Street

The intersection of SR 32 & Walnut Street is two-way stop control, and no turn lanes are provided at any of the approaches.

2.1.7 Cherry Street

The intersection of SR 32 & Cherry Street is two-way stop control, and no turn lanes are provided at any of the approaches.

2.1.8 East Street

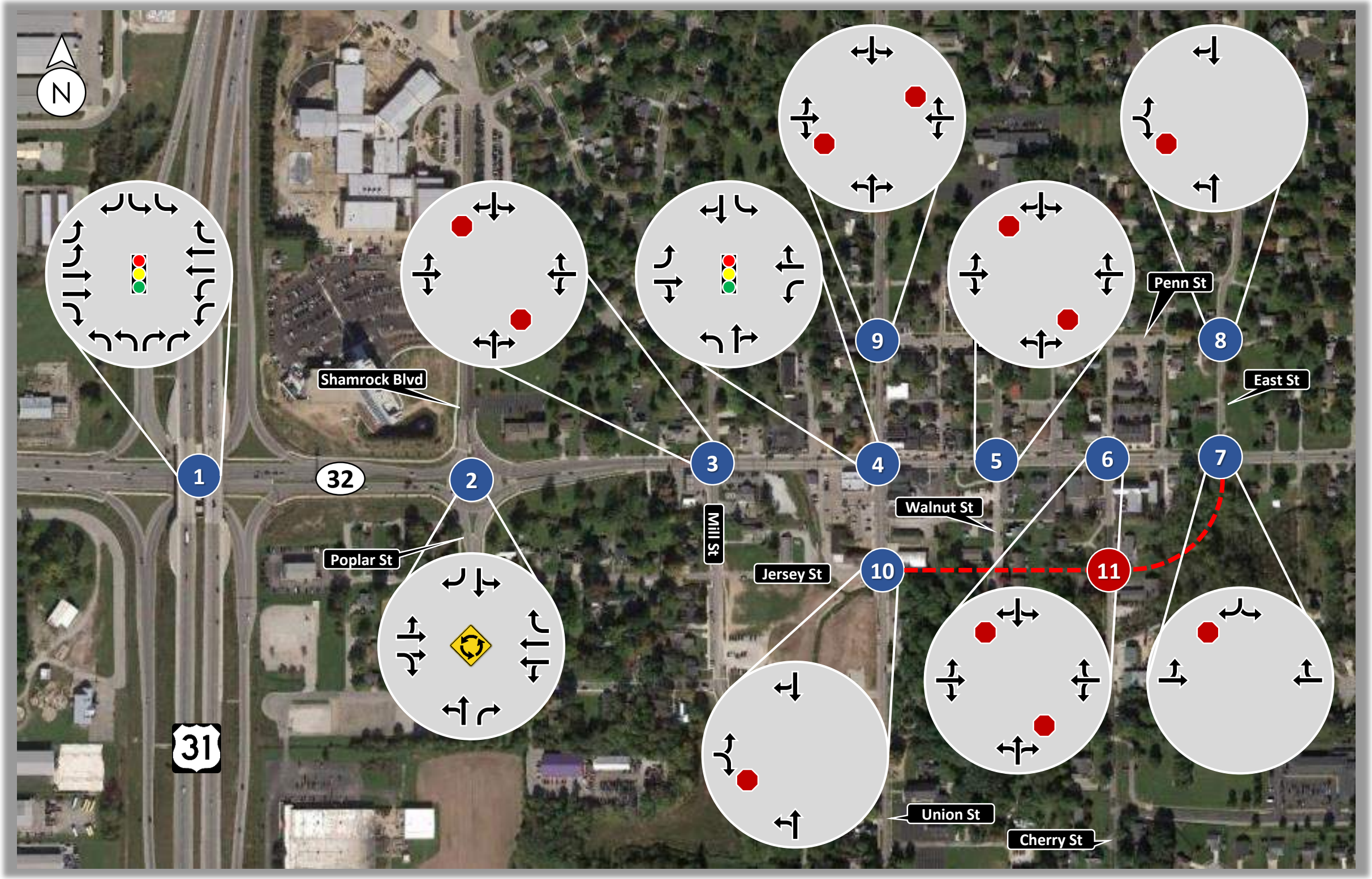
The intersection of SR 32 & East Street is one-way stop control, and no turn lanes are provided at any of the approaches. East Street is classified as a Major Collector with a speed limit of 20 mph in the vicinity of the study area.

2.1.9 Penn Street

Penn Street is a two-lane east/west roadway north of SR 32 with parking allowed on both sides of the street. The intersections along Penn Street currently operate as stop control.

2.1.10 Jersey Street

Jersey Street is a two-lane east/west roadway south of SR 32 that currently spans from Poplar Street to Union Street. A planned extension of Jersey Street will create a new alignment that spans from Union Street to East Street. The traffic analysis for this study assumes that the future alignment will be constructed by Opening Year 2022.



AMERICAN STRUCTUREPOINT INC.	Legend: 1 Existing Intersection; 1 Future Intersection; Traffic Signal; Stop Control; Roundabout; Jersey St Extension	SR 32 Reconstruction Westfield, IN	Figure 2.1 Existing Lane Configurations

3.0 Traffic Forecast

Traffic has been forecasted by first collecting base year (2019) traffic volumes, then applying an annual linear background traffic growth rate to obtain Opening Year 2022 and Design Year 2042 no-build (background) traffic volumes. Additionally, new site trips generated by the anticipated future developments were added to the background volumes to project Opening Year 2022 and Design Year 2042 build traffic volumes. The following sections of the report provide greater detail of these steps.

3.1 Existing Traffic Data

Turning movement counts were collected by American Structurepoint on Tuesday, December 11, 2018. The traffic data was captured during a typical, non-holiday week during the school year for the following peak time periods: 7:00 AM – 9:00 AM, 4:00 PM – 6:00 PM. The Existing Year 2019 traffic volumes are shown on **Figure 3.1**. The raw data from the traffic counts is provided in **Appendix A**.

Daily traffic counts were also collected at three (3) locations along SR 32 in order to assess the daily traffic patterns for the corridor. The Average Daily Traffic (ADT) volumes are shown in **Table 3.1**.

Table 3.1 – SR 32 Average Daily Traffic

Location	2-Way ADT
SR 32, east of Poplar Street	15,100
SR 32, btw Walnut Street and Cherry Street	16,700
SR 32, east of East Street	17,300

INDOT provided traffic data for the weekend of March 9-10, 2019, at the intersection of SR 32 & Union Street in order to provide a comparison with weekday peak hour traffic. The City of Westfield had indicated that weekend peak hour traffic characteristics may present different turning movement magnitudes than weekday peak hour traffic; therefore, a comparison of the data will help identify the potential need for an evaluation of weekend traffic operations. A comparison of the peak hour traffic volumes at SR 32 & Union Street are shown in **Table 3.2**. The weekend traffic data is provided in **Appendix A**.

Table 3.2 – SR 32 & Union Street Peak Hour Traffic Data Comparison

Day of Week / Peak Hour	Total Intersection Volume	Percent Difference (%)
Weekday / PM	2,040	--
Saturday / Midday	1,650	-19%
Sunday / Midday	1,230	-40%

The peak hour traffic data comparison at SR 32 & Union Street shows that Saturday peak traffic volumes are approximately 19% lower than the PM peak hour traffic volumes on a typical weekday. Based on a review of the turning movement volumes between the respective peak hours, none of the turning movements from

the weekend count data were significantly higher than the weekday volumes, which indicates that additional analysis to account for weekend traffic characteristics is not required. The weekday AM and PM peak hour traffic volumes will dictate the worst-case scenario for intersection improvement needs.

3.2 Background Traffic Growth

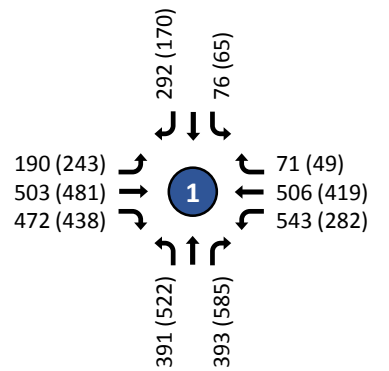
Background traffic growth for the study area was determined based on travel demand output information provided by the INDOT Technical Planning Support & Programming Division. Per the INDOT travel demand model, the SR 32 study segment is anticipated to incur a 0.896% compound annual growth rate. In order to be conservative with the traffic analysis, an annual linear growth rate of 1.0% was used for this study. The 1.0% annual linear growth rate was approved by INDOT.

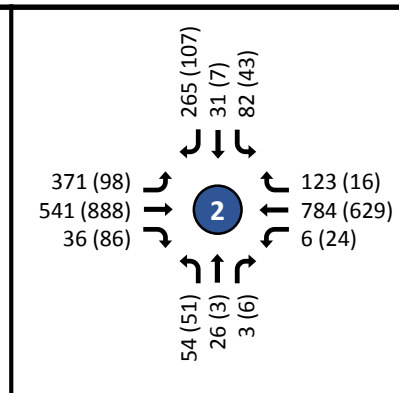
The traffic projections for background growth also include future developments west of US 31 in the vicinity of Wheeler Road and Dartown Road which are anticipated to be completed prior to the Opening Year 2022, regardless of the SR 32 project through downtown Westfield. The trip generation estimates used for these developments are based on Planned Unit Development (PUD) documents and other information provided by the City of Westfield. **Table 3.3** contains the total number of AM peak hour, PM peak hour, and Daily trips that are expected to be generated as part of the background growth. A detailed breakdown of the net new vehicle trips for each respective development area is provided in **Appendix B**.

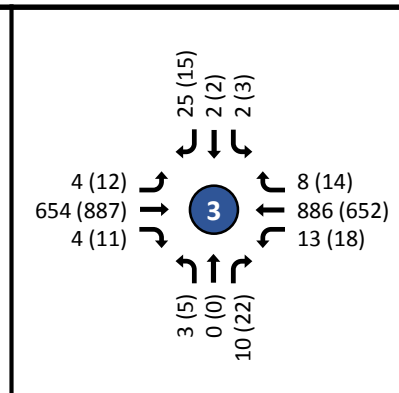
Table 3.3 – Future Development Background Site Trips (West of US 31)

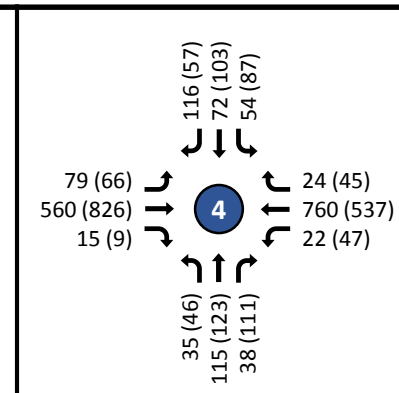
Trip Types	AM	PM	Daily
Total	1,501	3,021	33,038
Internal Capture	147	280	3,302
Pass-By	319	742	8,220
Mode-Choice Reduction	0	0	0
Net New Vehicle Trips	**1,035**	**1,999**	**21,516**

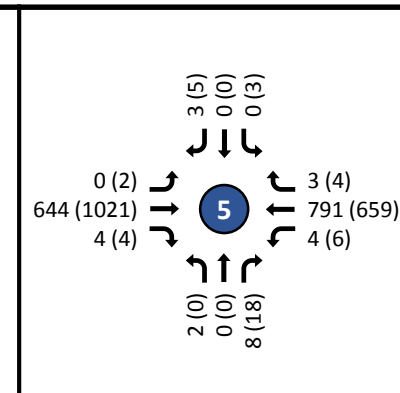
The Construction Year for the project is anticipated to be 2022; therefore, traffic volumes were projected for an Opening Year 2022 and a Design Year 2042 for the traffic analysis. The projected traffic volumes for the future year no-build (background) scenarios are shown on **Figure 3.2** and **Figure 3.3**, respectively.

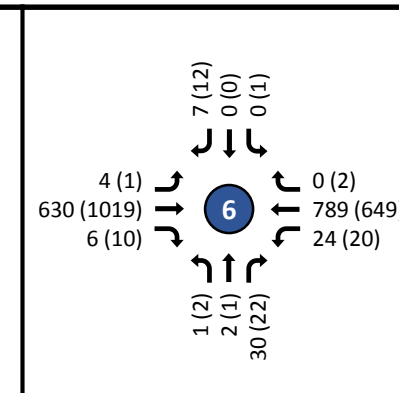


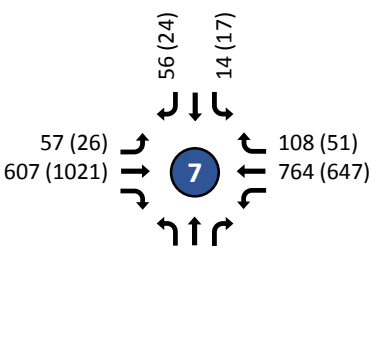


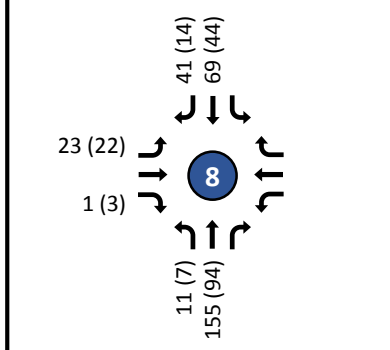


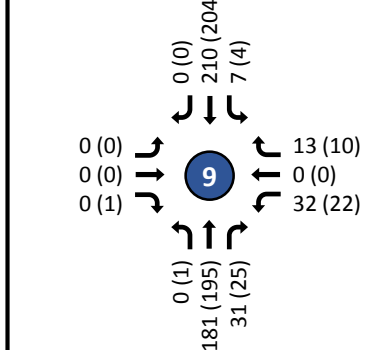


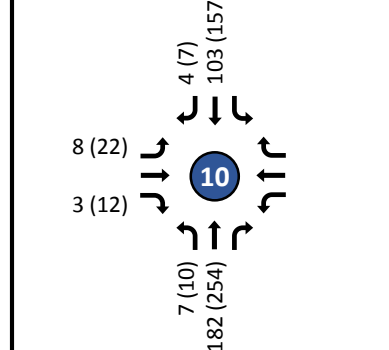


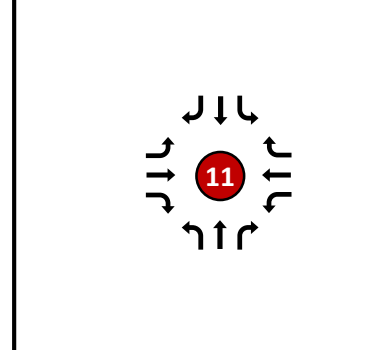












AMERICAN STRUCTUREPOINT INC.

Legend

1 Intersection Number (Existing)

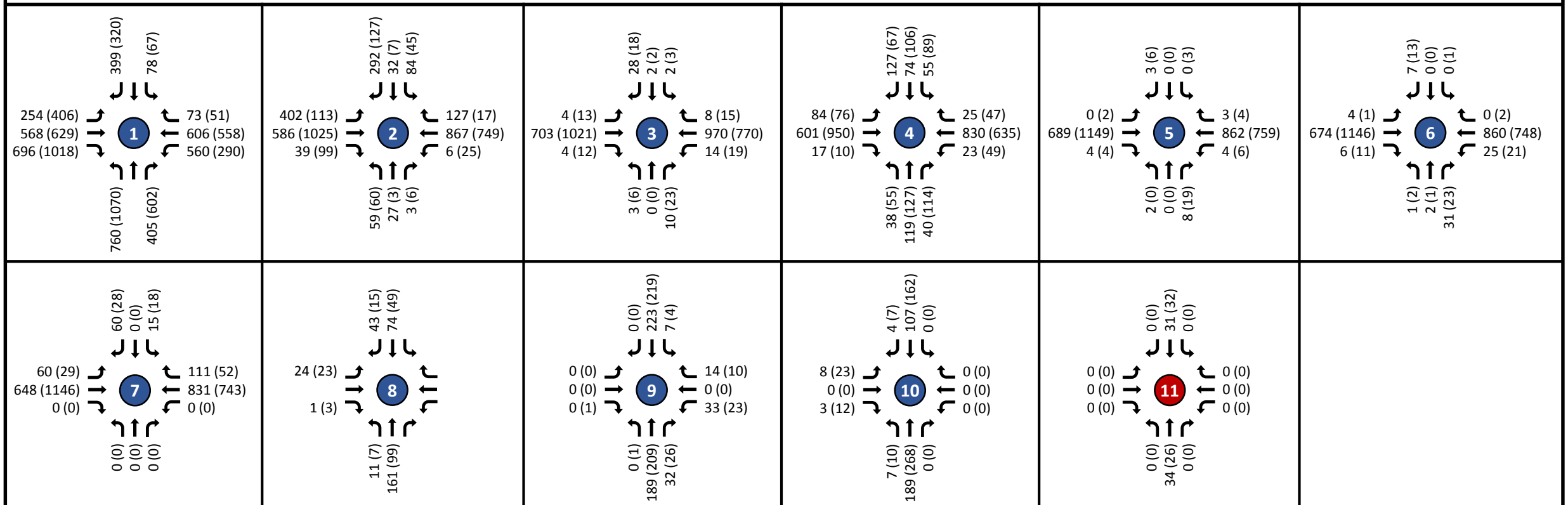
1 Intersection Number (Future)

Jersey Street Future Extension

111 (222) AM (PM) Traffic Volumes

SR 32 Reconstruction
Westfield, IN

Figure 3.1
Existing Year 2019 Traffic Volumes



AMERICAN STRUCTUREPOINT INC.

Legend

1 Intersection Number (Existing)

1 Intersection Number (Future)

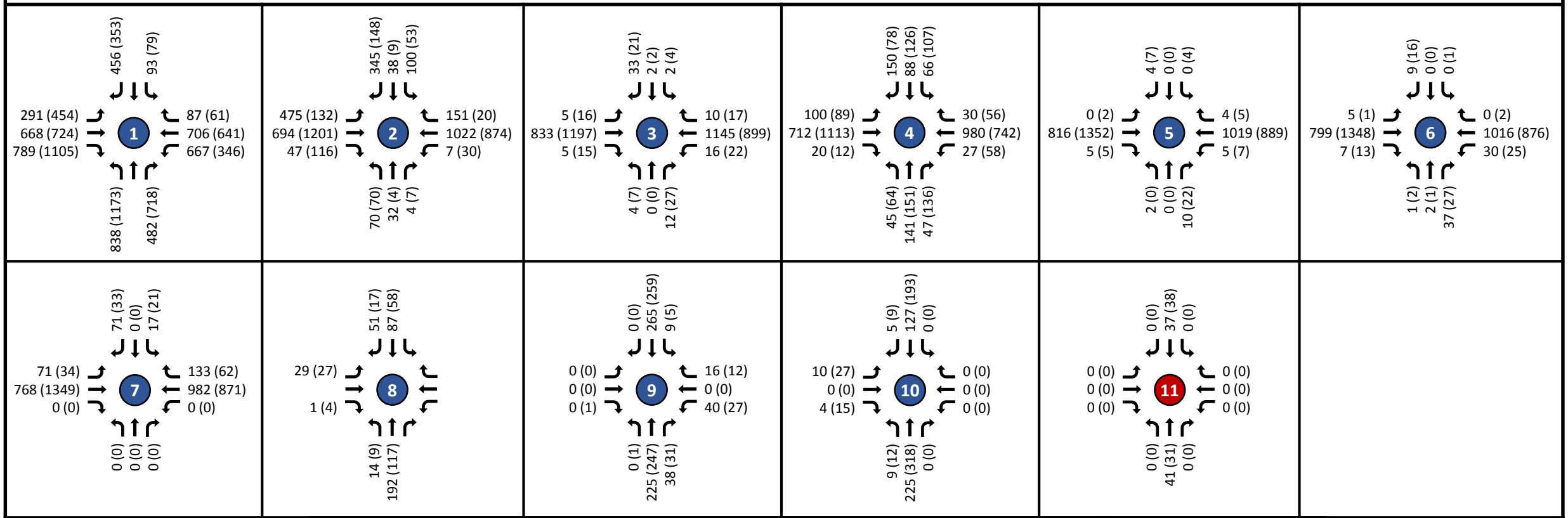
Jersey Street Future Extension

111 (222) AM (PM) Traffic Volumes

SR 32 Reconstruction
Westfield, IN

Figure 3.2

Opening Year 2022 No-Build Volumes



AMERICAN STRUCTUREPOINT INC.

Legend

1 Intersection Number (Existing)

1 Intersection Number (Future)

Jersey Street Future Extension

111 (222) AM (PM) Traffic Volumes

SR 32 Reconstruction
Westfield, IN

Figure 3.3
Design Year 2042
No-Build Volumes

3.3 SR 32 Redevelopment

3.3.1 Trip Generation

Redevelopment is expected to occur along SR 32 as part of the widening of the roadway. At the time of this study, the redevelopment is anticipated to happen south of SR 32 with limits that are roughly bounded by Mill Street to the west and Cherry Street to the east. A map of the expected SR 32 redevelopment location is shown on **Figure 3.4**. The developments are expected to consist of the following land uses: retail, office, and residential. The Institute of Transportation Engineers (ITE) *Trip Generation Manual, 10th Edition* was used to calculate the generated trips for the anticipated future redevelopment. **Table 3.4** contains the total number of AM peak hour, PM peak hour, and Daily trips that are expected to be generated.

Table 3.4 – SR 32 Redevelopment Trip Generation

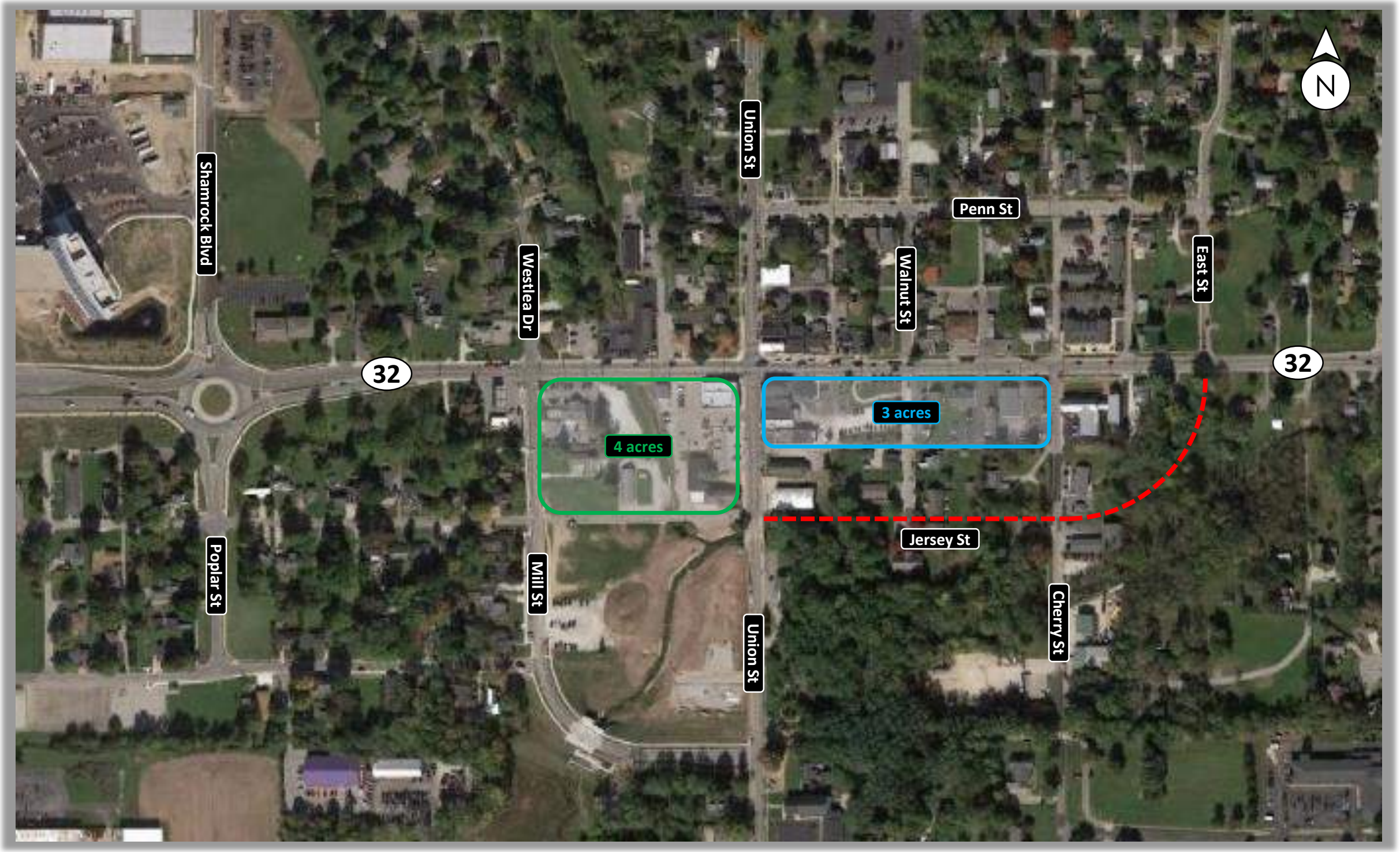
Trip Types	AM	PM	Daily
Total	239	560	6,709
Internal Capture	18	59	671
Pass-By	14	124	1,434
Mode-Choice Reduction	0	0	0
Net New Vehicle Trips	**207**	**377**	**4,604**

The trip generation projections for the redevelopment were based on information provided by the City of Westfield. The trip generation assumptions were approved by the City of Westfield and INDOT based on a design coordination meeting held on March 13, 2019. The land use projections are subject to change in the future, however, and additional analysis will be required if future site plans for these areas indicate that a higher rate of added trips will be generated during the peak hours.

Internal trips and pass-by trips were accounted for in the trip reduction process for the applicable land uses. Mode-choice reduction trips (public transit, walking, and biking) were considered inapplicable to this area, as all trips are anticipated to be vehicle-driven based on discussion with INDOT. After accounting for the internal capture and pass-by trip reductions, the resulting net new site trips are summarized in **Table 3.5**. A breakdown of the net new vehicle trips for the redevelopment is provided in **Appendix B**.

Table 3.5 – SR 32 Redevelopment (7 acres): Net New Vehicle Trips

Land Use Type	Size	Unit	Net New Vehicle Trips		
			AM	PM	Daily
Retail	50	KSF	26	240	2,782
Office	50	KSF	92	48	498
Residential	200	DU	90	90	1,324
Total			**208**	**378**	**4,604**



Note: Limits of development outlines shown on map are based information provided by the City of Westfield

AMERICAN STRUCTUREPOINT INC.

Legend

- SR 32 Redevelopment
- Union St/Mill St development
- Jersey Street Future Extension

SR 32 Reconstruction
Westfield, IN

Figure 3.4
Map of SR 32 Redevelopment Limits

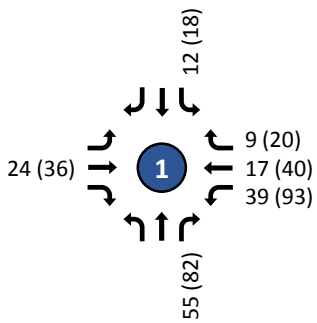
3.3.2 Trip Distribution and Assignment

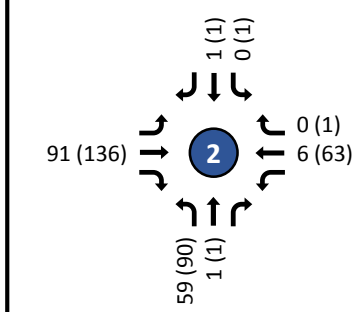
Trip distribution percentages were calculated based on Annual Average Daily Traffic (AADT) volumes along the external roadways to the study area. These percentages were then modified to take into account major origin and destination centers such as interstate access and heavy residential areas. The trip distribution percentages that were used to assign the added trips to the study area roadway network are provided in **Table 3.6**. A detailed breakdown of the trip distribution calculations is provided in **Appendix B**.

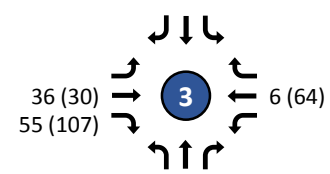
Table 3.6 – Trip Distributions (SR 32 Redevelopment)

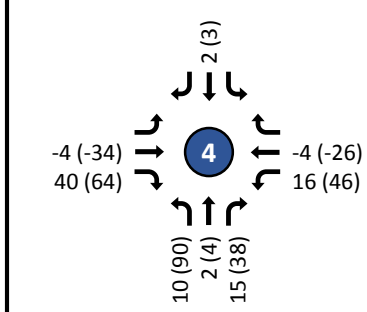
To/From	Via Roadway	Percentage
North	US 31	10%
South	US 31	46%
East	SR 32	15%
West	SR 32	20%
--	Other	9%
Total		**100%**

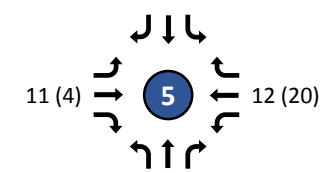
The trip distribution percentages were applied to the trip ends generated by each development and assigned to each roadway. The trip assignment was facilitated through the use of Vistro (Version 5), which assigns traffic to intersections based on manually assigned routes between each origin-destination. The net new added site trips for Design Alternative A, B, and C are shown on **Figure 3.5** through **Figure 3.7**, respectively. The site trips were added to the Opening Year 2022 No-Build and Design Year 2042 No-Build Traffic Volumes to achieve Opening Year 2022 Build and Design Year 2042 Build Traffic Volumes, which are shown on **Figure 3.8** through **Figure 3.10** (Opening Year 2022 Build), and **Figure 3.11** through **Figure 3.13** (Design Year 2042 Build), respectively for each of the design alternatives.

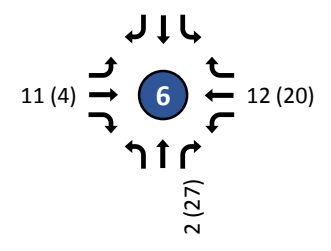


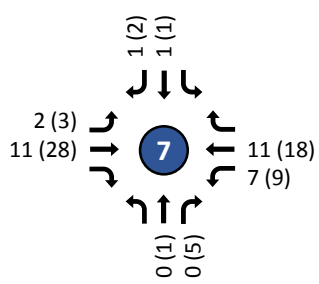


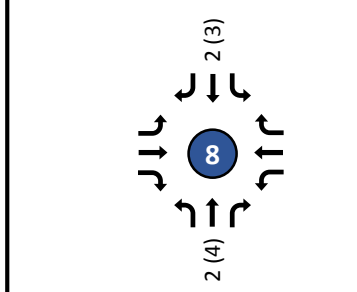


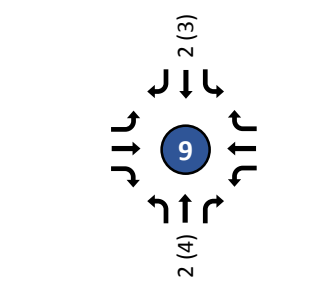


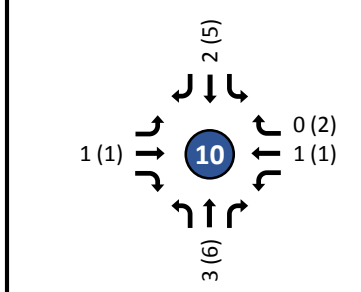


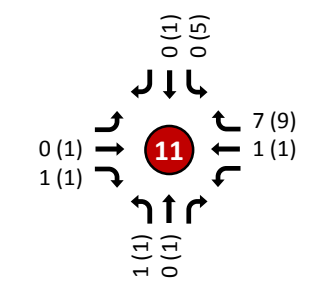












AMERICAN STRUCTUREPOINT INC.

Legend

1 Intersection Number (Existing)

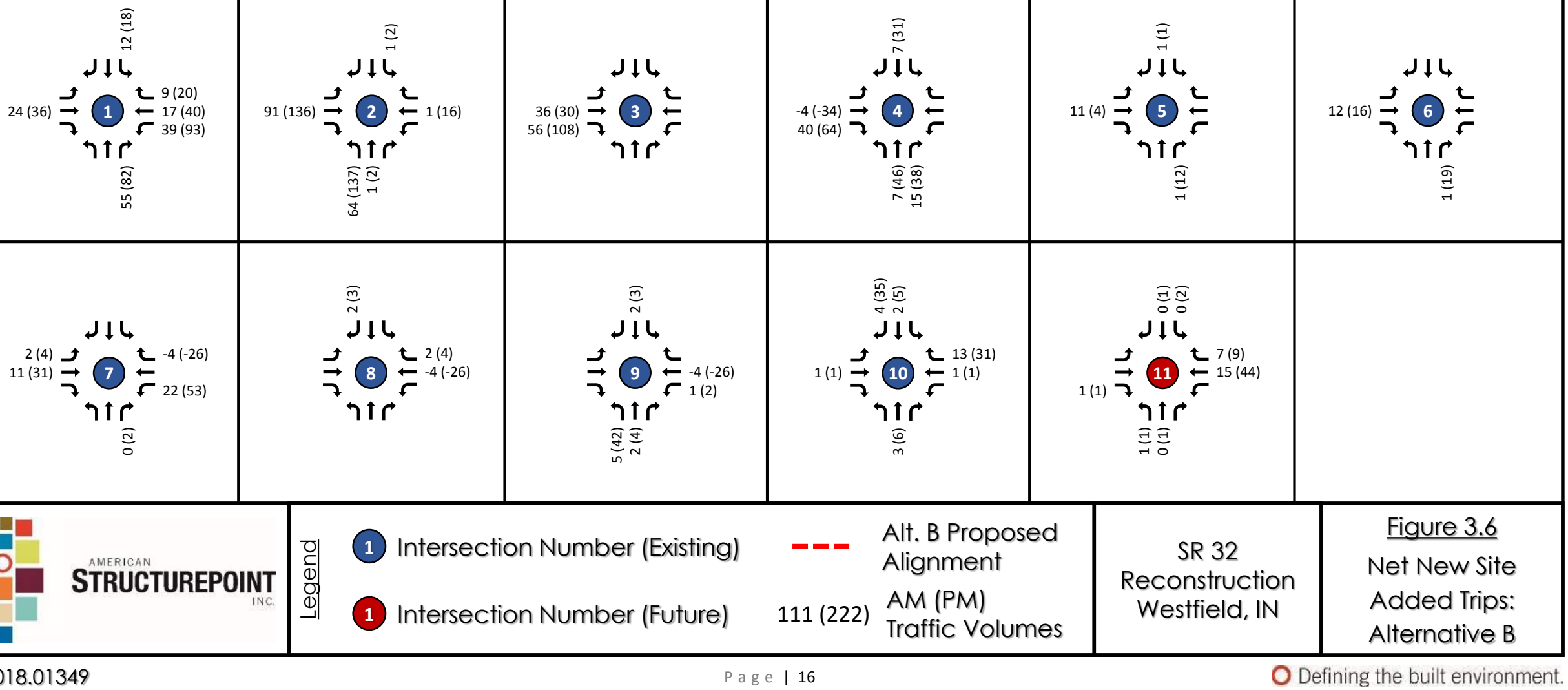
1 Intersection Number (Future)

Jersey Street Future Extension

111 (222) AM (PM) Traffic Volumes

SR 32 Reconstruction
Westfield, IN

Figure 3.5
Net New Site Added Trips: Alternative A



AMERICAN STRUCTUREPOINT INC.

Legend

1 Intersection Number (Existing)

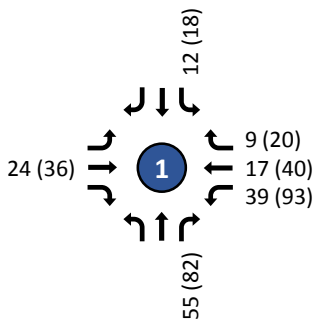
1 Intersection Number (Future)

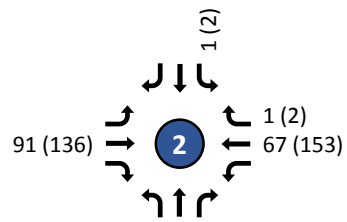
Alt. B Proposed Alignment

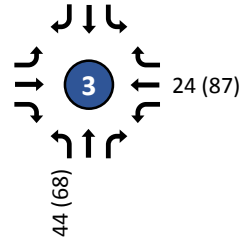
111 (222) AM (PM) Traffic Volumes

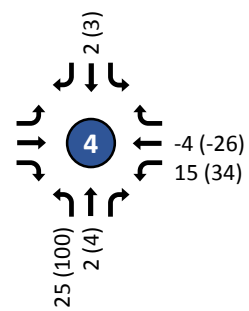
SR 32 Reconstruction
Westfield, IN

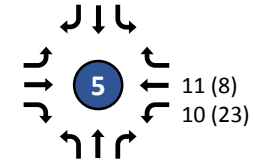
Figure 3.6
Net New Site Added Trips: Alternative B

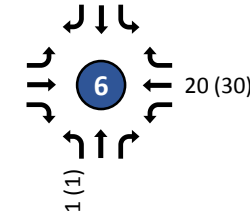


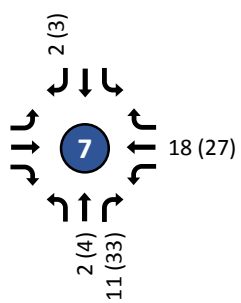


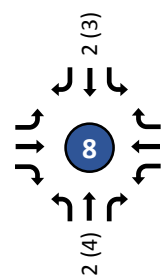


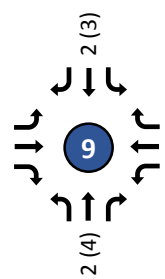


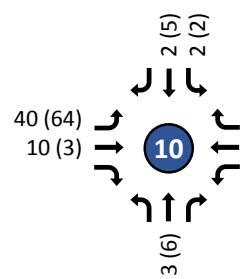


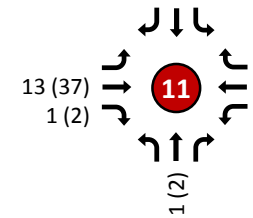












AMERICAN STRUCTUREPOINT INC.

Legend

1 Intersection Number (Existing)

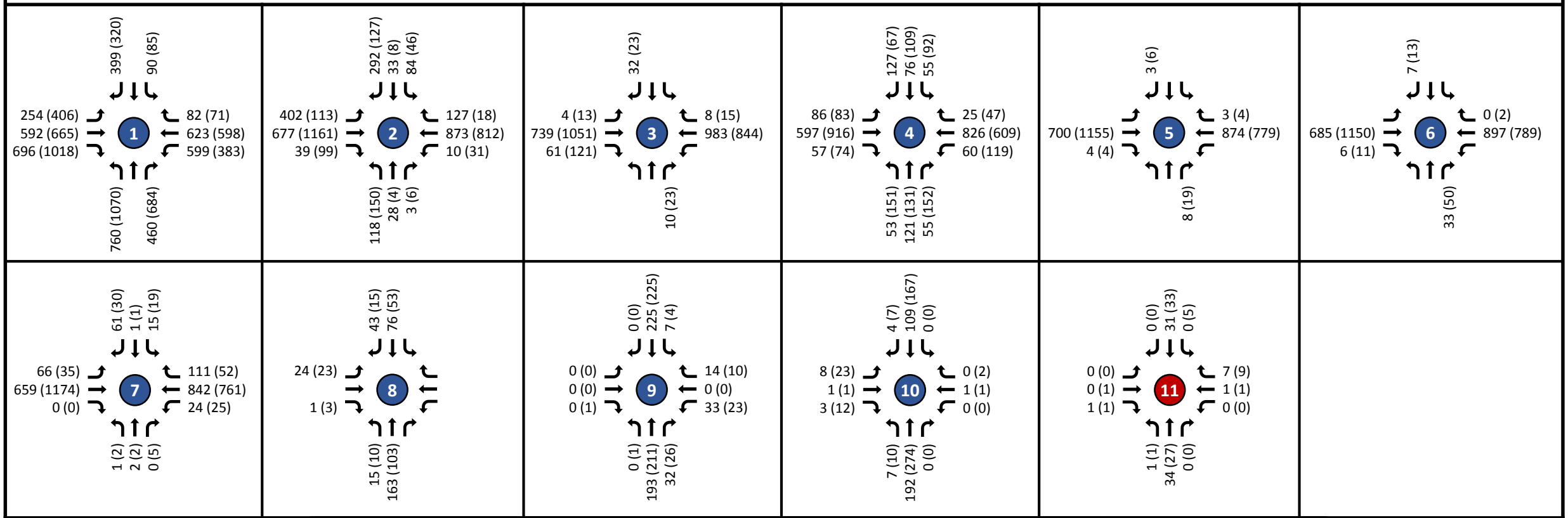
1 Intersection Number (Future)

Alt. C Proposed Alignment

111 (222) AM (PM) Traffic Volumes

SR 32 Reconstruction
Westfield, IN

Figure 3.7
Net New Site Added Trips: Alternative C



AMERICAN STRUCTUREPOINT INC.

Legend

1 Intersection Number (Existing)

1 Intersection Number (Future)

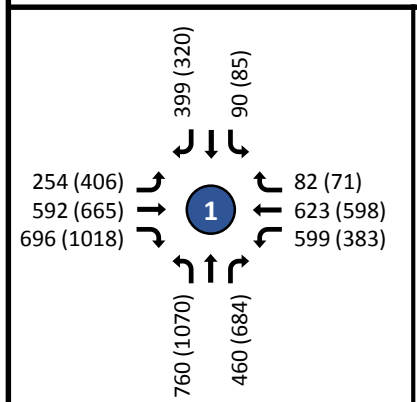
Jersey Street Future Extension

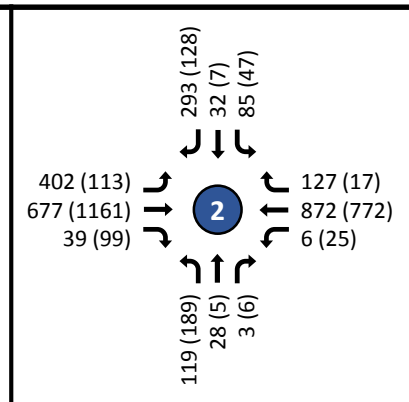
111 (222) AM (PM) Traffic Volumes

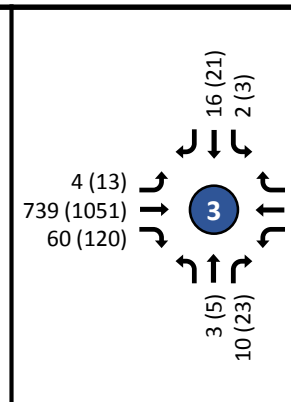
SR 32 Reconstruction Westfield, IN

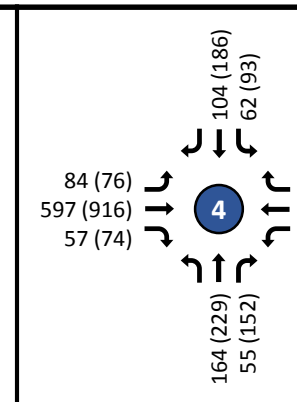
Figure 3.8

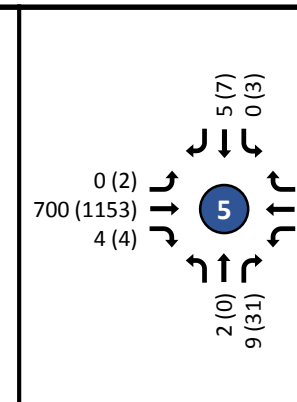
Opening Year 2022 Build Volumes Alternative A

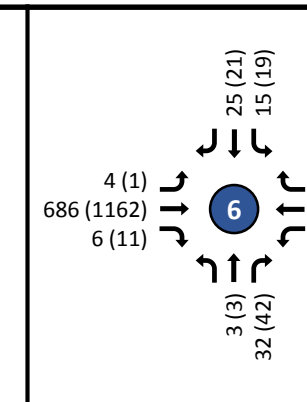


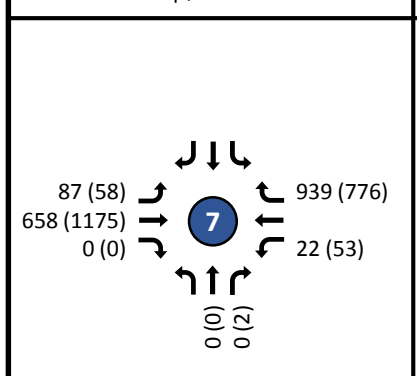


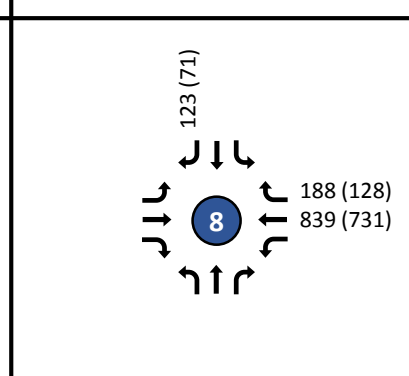


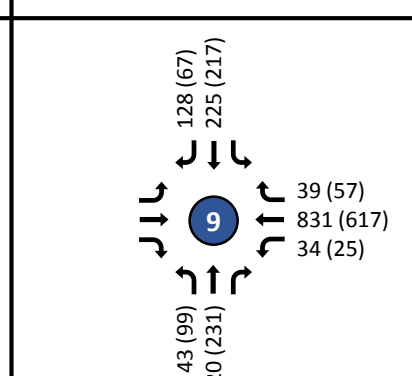


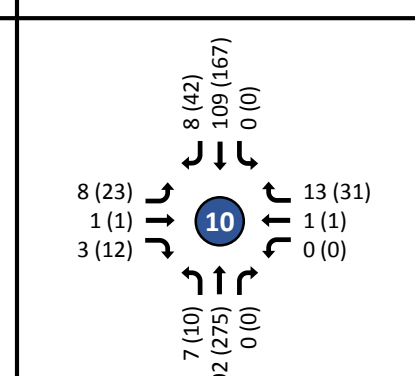


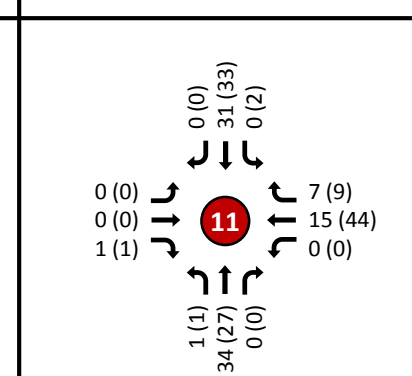












Legend

1 Intersection Number (Existing)

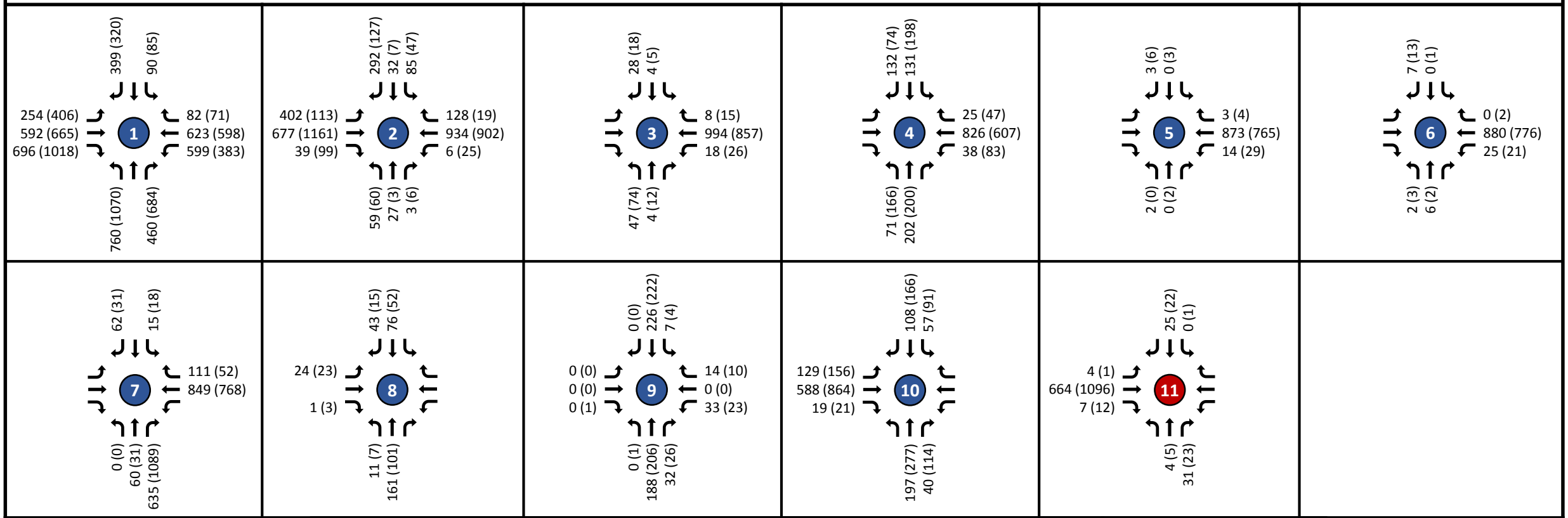
1 Intersection Number (Future)

Alt. B Proposed Alignment

111 (222) AM (PM) Traffic Volumes

SR 32 Reconstruction
Westfield, IN

Figure 3.9
Opening Year 2022 Build Volumes
Alternative B



AMERICAN STRUCTUREPOINT INC.

Legend

1 Intersection Number (Existing)

1 Intersection Number (Future)

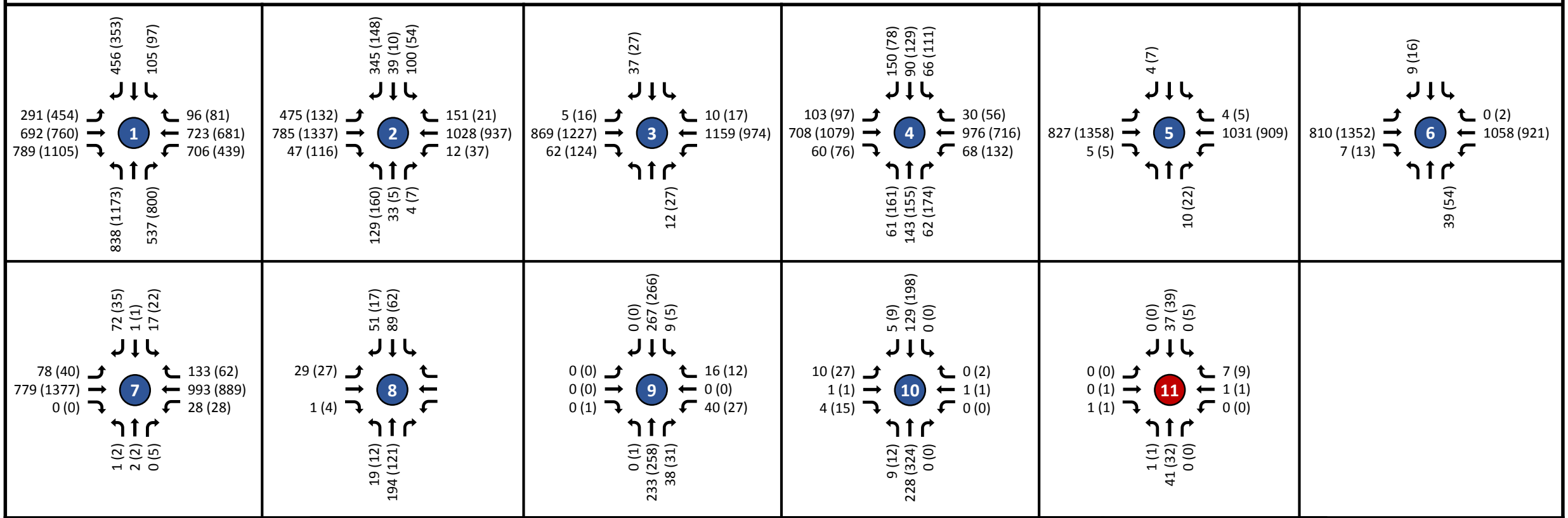
Alt. C Proposed Alignment

111 (222) AM (PM) Traffic Volumes

SR 32 Reconstruction Westfield, IN

Figure 3.10

Opening Year 2022 Build Volumes Alternative C



AMERICAN STRUCTUREPOINT INC.

Legend

1 Intersection Number (Existing)

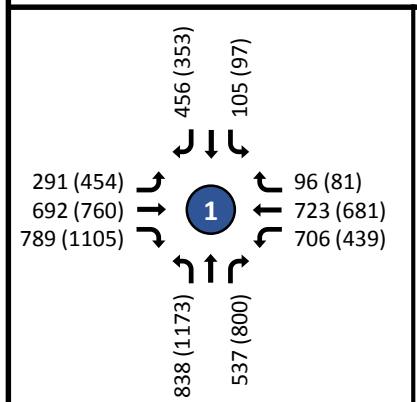
1 Intersection Number (Future)

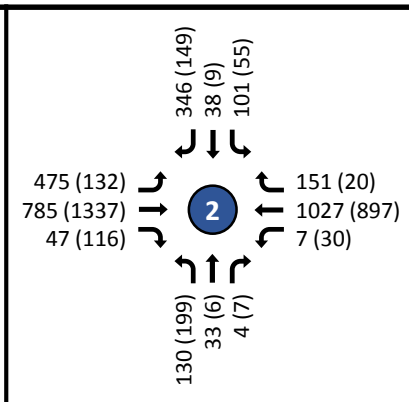
Jersey Street Future Extension

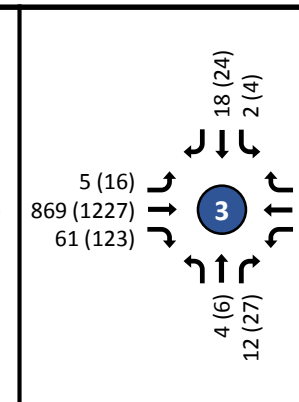
111 (222) AM (PM) Traffic Volumes

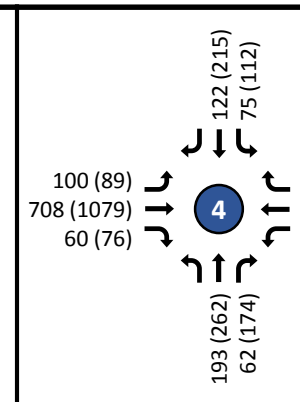
SR 32 Reconstruction
Westfield, IN

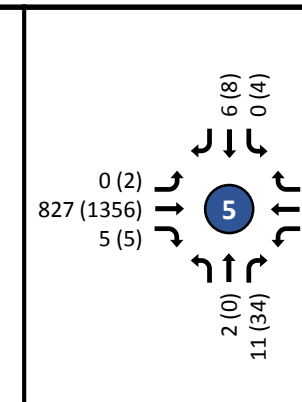
Figure 3.11
Design Year 2042
Build Volumes
Alternative A

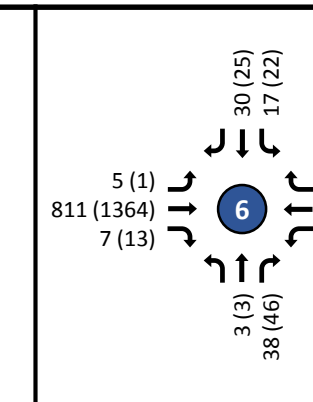


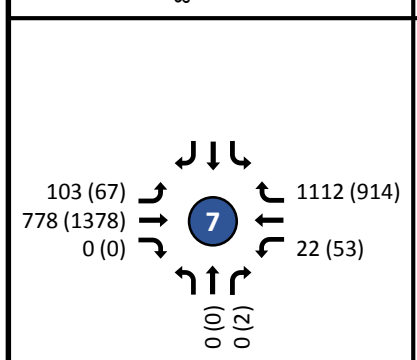


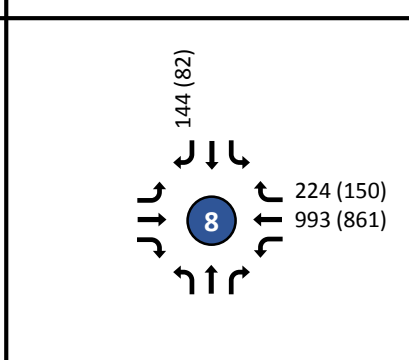


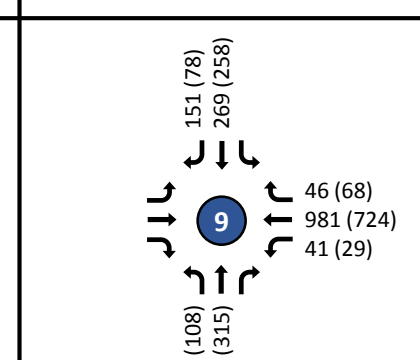


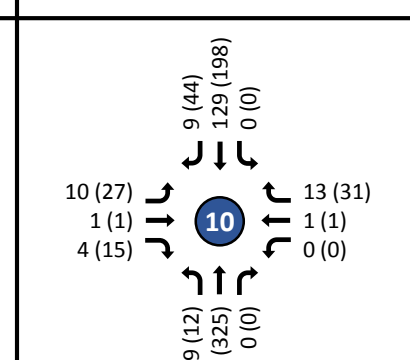


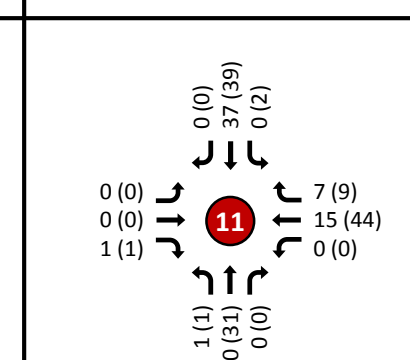












AMERICAN STRUCTUREPOINT INC.

Legend

1 Intersection Number (Existing)

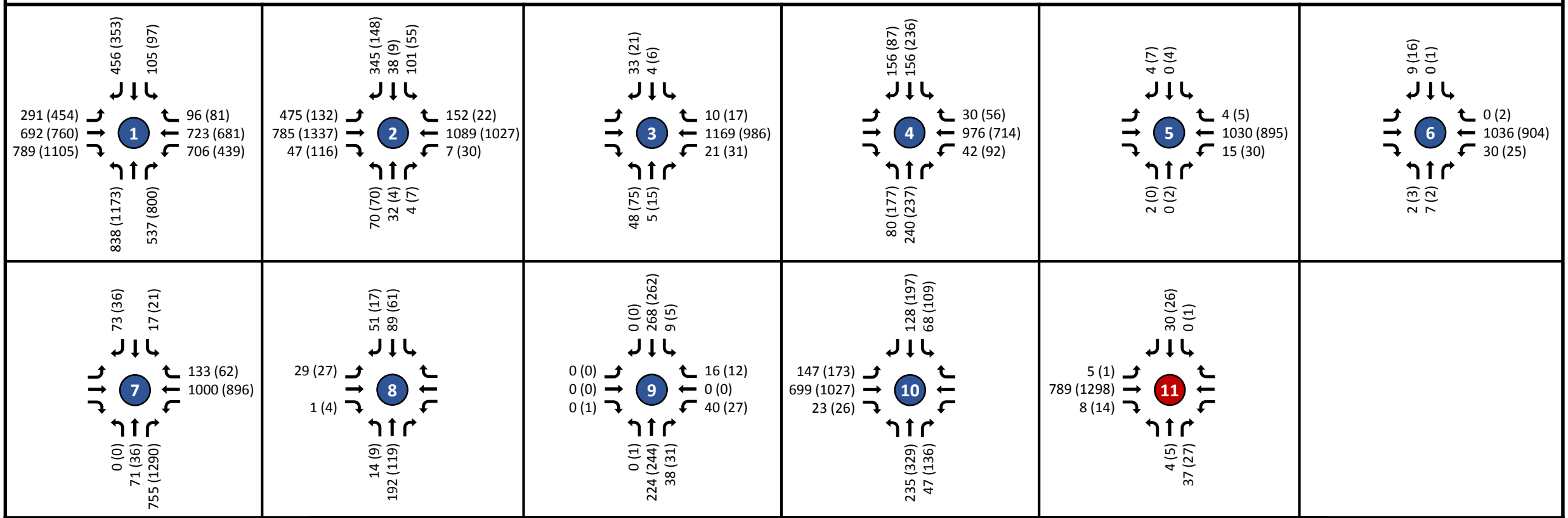
1 Intersection Number (Future)

Alt. B Proposed Alignment

111 (222) AM (PM) Traffic Volumes

SR 32 Reconstruction
Westfield, IN

Figure 3.12
Design Year 2042
Build Volumes
Alternative B



AMERICAN STRUCTUREPOINT INC.

Legend

1 Intersection Number (Existing)

1 Intersection Number (Future)

Alt. C Proposed Alignment

111 (222) AM (PM) Traffic Volumes

SR 32 Reconstruction
Westfield, IN

Figure 3.13
Design Year 2042
Build Volumes
Alternative C

4.0 Traffic Signal Warrant Analysis

A traffic signal warrant analysis has been completed for the following intersections:

- Penn Street & Union Street (Alternative 2)
- Jersey Street & Union Street (Alternative 3)

The traffic signal warrant analysis is based on the guidelines presented in the *Indiana MUTCD*. Warrant 1 (utilizing the available AM and PM peak hour volumes) was considered to be the applicable warrant for this study. The remaining warrants were found to be non-applicable or the required information was not available at this time. Additional warrants and further analysis would need to be performed if either Alternative 2 or Alternative 3 was deemed the preferred option. Right turn on red (RTOR) reductions on minor lane approaches were incorporated in the analysis. A summary of the traffic signal warrant analysis is provided in **Table 4.1**. A detailed breakdown of the signal warrant analysis is provided in **Appendix C**.

Table 4.1 – Traffic Signal Warrant Analysis

Intersection	Signal Warrant Status
Penn Street & Union Street (Alternative 2)	Met
Jersey Street & Union Street (Alternative 3)	Met

5.0 Turn Lane Warrant Analysis

Based upon discussions during the Design Coordination meeting with INDOT on April 10, 2019, it was determined that INDOT's preference is to provide auxiliary lanes where possible to mitigate operational concerns during the design process. Therefore, regardless of meeting the turn-lane warrant thresholds, dedicated left-turn lanes are recommended along SR 32 for all three (3) alternatives analyzed along with dedicated right-turn lanes at the signalized intersections. Due to concerns with right-of-way and potential impacts to historic structures, the westbound right-turn lane at SR 32 & Union Street was deemed non-essential.

A turn lane warrant analysis has been completed for the right turns at the unsignalized intersections for the build scenarios. The turn lane warrant analysis is based on the guidelines presented in the *Indiana Design Manual*. A summary of the turn lane warrant analysis is provided in **Table 5.1**. A detailed breakdown of the turn lane warrant analysis is provided in **Appendix D**.

Table 5.1 – Right-Turn Lane Warrant Analysis

Intersection	Alternative A		Alternative B		Alternative C	
	EB	WB	EB	WB	EB	WB
SR 32 & Mill Street	**Met**	Not Met	**Met**	N/A	N/A	Not Met
SR 32 & Walnut Street	Not Met	Not Met	Not Met	N/A	N/A	Not Met
SR 32 & Cherry Street	Not Met	Not Met	Not Met	N/A	N/A	Not Met
SR 32 & East Street	--		N/A	**Met**	--	
Jersey Street & Cherry Street	--		--		Not Met	N/A

N/A – turn lane does not exist due to 1-way pair

"blank" – turn lane warrant was not analyzed (minor intersection)

6.0 Capacity Analysis

A capacity analysis has been performed for all study intersections for each scenario. The capacity analysis for the signalized and unsignalized (stop control) intersections was performed using Synchro (Version 9.2), and the capacity analysis for the roundabout intersections was performed using SIDRA (Version 8). All analyses were reported using the methodology outlined in the *Highway Capacity Manual* (HCM).

The standard parameter used to evaluate traffic operating conditions is referred to as the level-of-service (LOS). There are six LOS (A through F) which relate to driving conditions from best to worst, respectively. LOS for signalized and unsignalized (stop-control and roundabout) intersections is defined in terms of control delay per vehicle, which is a direct correlation to driver discomfort, frustration, fuel consumption, and lost travel time. **Table 6.1** provides the LOS criteria as defined in the *HCM*.

Table 6.1 – LOS Thresholds

LOS	Delay per Vehicle (seconds)	
	Signalized/Roundabout Intersections	Unsignalized Intersections
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

In general for the capacity analysis criteria, the operating conditions of intersections were considered to be acceptable if found to operate at LOS D or better for the overall intersection, with no approach operating worse than LOS E for the existing intersections and the new intersections created by the alternative alignments. Capacity improvements are identified for the locations not meeting the criteria. Improvements

were also recommended if the 95th percentile queue lengths were determined to have an adverse impact on corridor traffic operations.

Turn lane length recommendations were based on providing sufficient storage to accommodate 95th percentile queue lengths within the storage bay of the turn lane. Where practical, the recommended turn lane length accounts for the queue length of the adjacent through lane such that the through lane would not block entry into the turn lane.

The capacity analysis results are summarized for all scenarios in the tables on **pages 36-53** for the AM and PM peak hours, respectively. The capacity analysis output is provided in **Appendix E**.

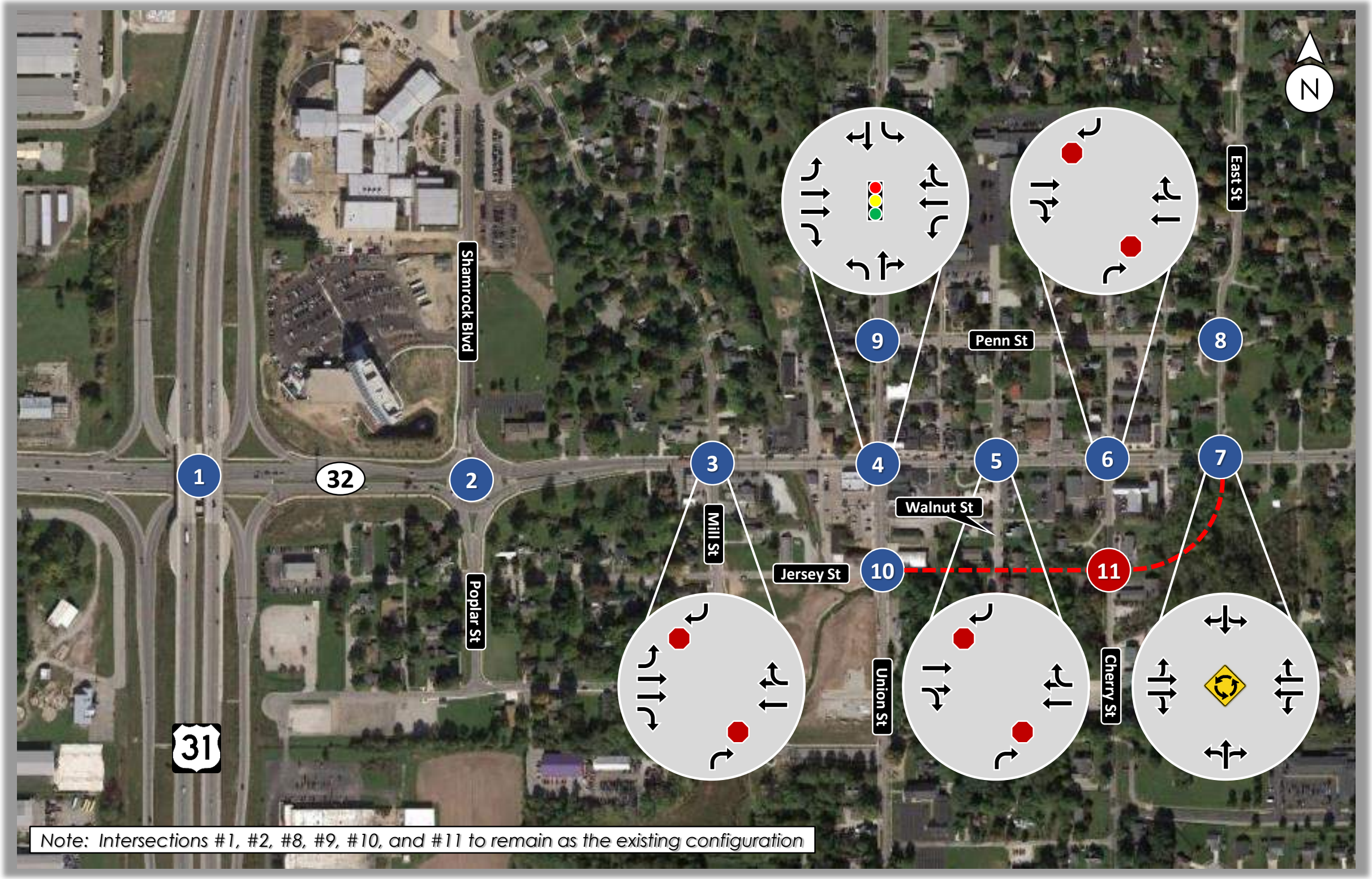
The study scenarios are listed as follows:

- Scenario 1 – Existing Year 2019
- Scenario 2 – Opening Year 2022 No-Build
- Scenario 3 – Opening Year 2022 Build
- Scenario 4 – Design Year 2042 No-Build
- Scenario 5 – Design Year 2042 Build

The alternative alignments are listed as follows:

- Alternative A – SR 32 (4-lane) with access management
- Alternative B – One-Way pair with SR 32 eastbound (2-lane) and Penn Street westbound (2-lane)
- Alternative C – One-Way pair with SR 32 westbound (2-lane) and Jersey Street eastbound (2-lane)

The recommended lane configurations for Design Alternative A, B, and C are shown on **Figure 6.1** through **Figure 6.3**, respectively. Conceptual layouts for Design Alternative A, B, and C, are provided in **Appendix F**.



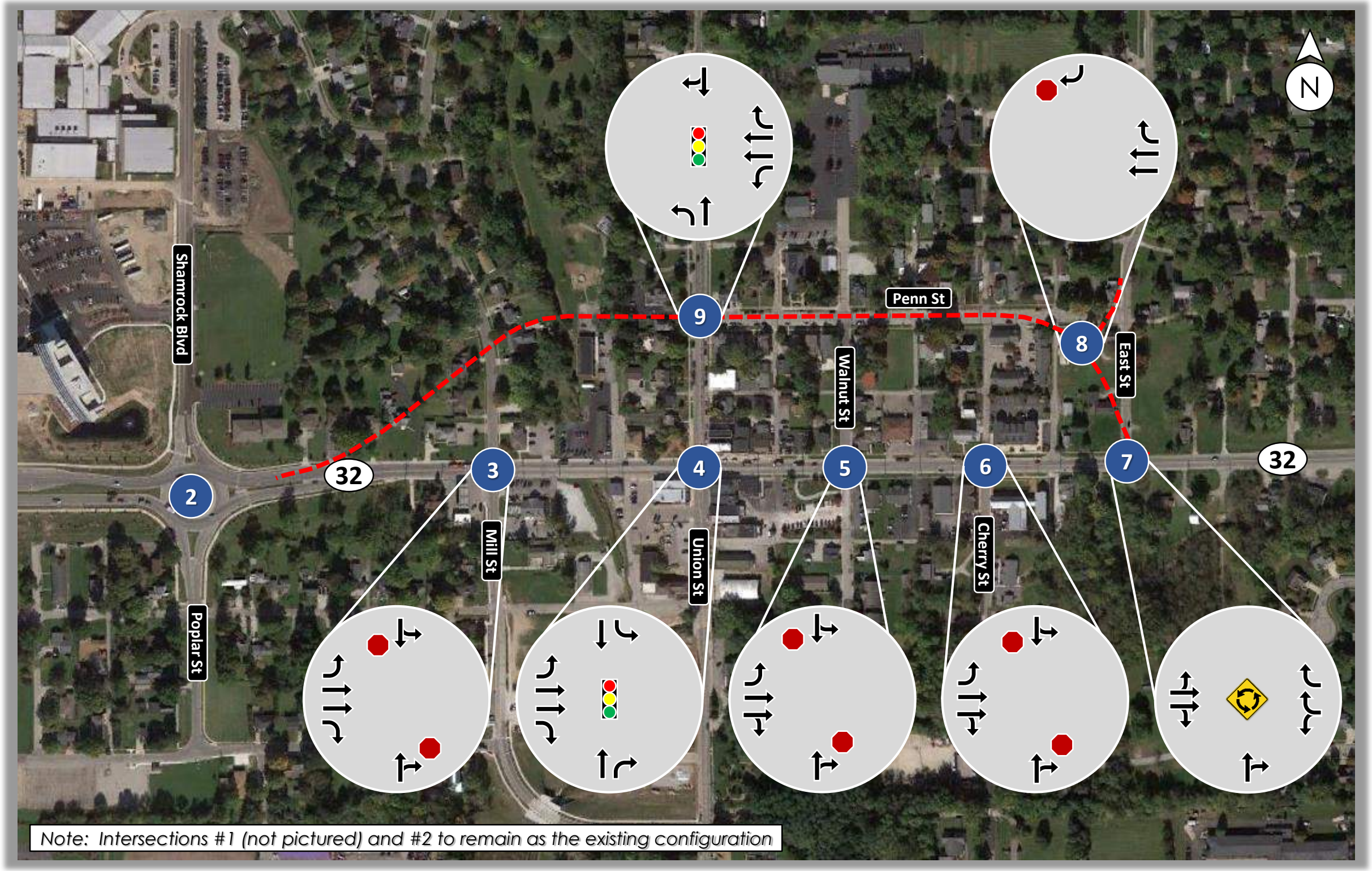
AMERICAN STRUCTUREPOINT INC.

Legend

- 1 Existing Intersection
- 1 Future Intersection
- Traffic Signal
- Stop Control
- Roundabout
- Jersey St Extension

SR 32 Reconstruction Westfield, IN

Figure 6.1
Recommended Lane Config. (Alternative A)



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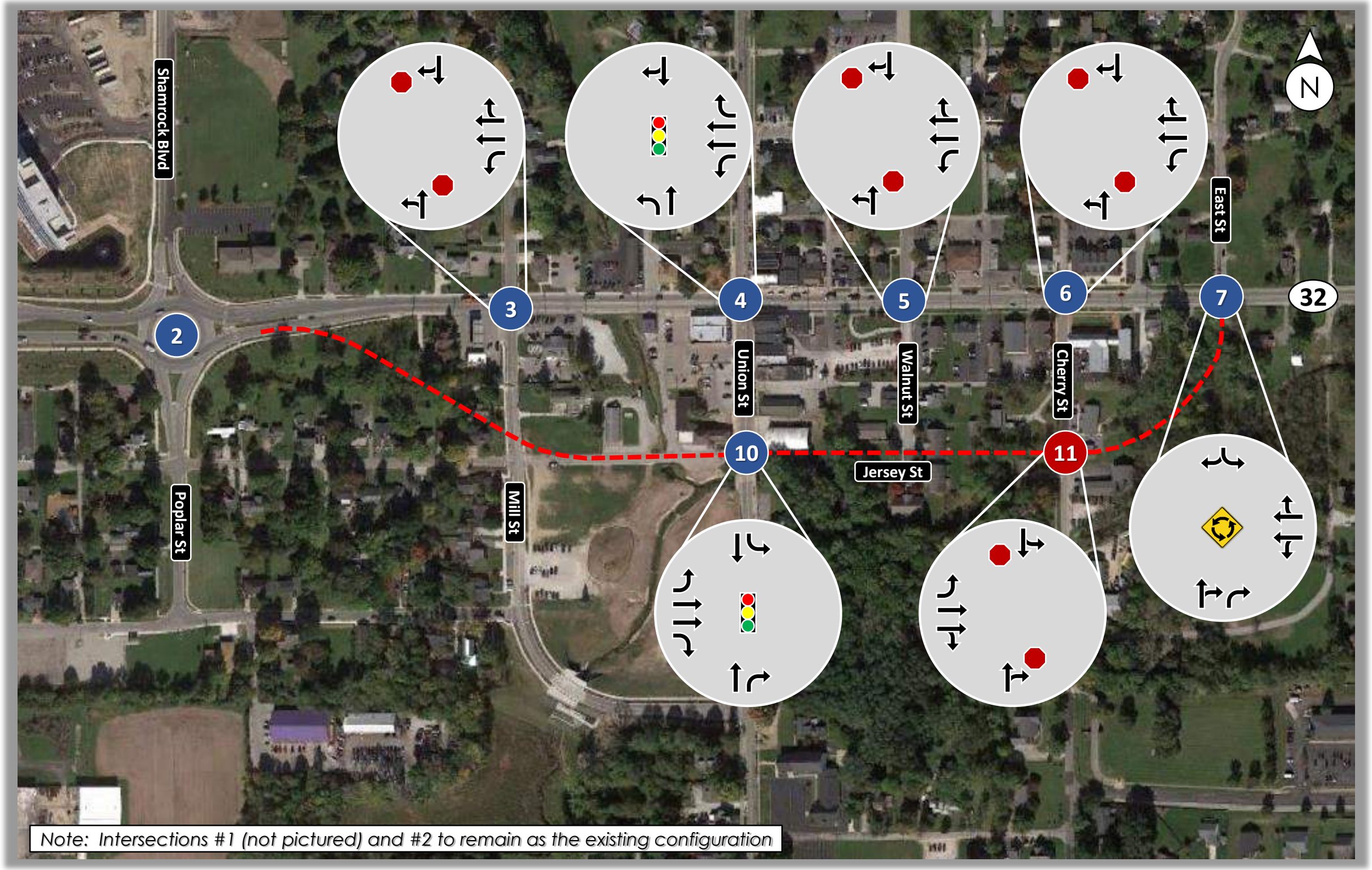
Legend

- 1 Existing Intersection
- 1 Future Intersection
- Traffic Signal
- Stop Control
- Roundabout
- Penn Street 1-Way WB

SR 32 Reconstruction
Westfield, IN

Figure 6.2
Recommended Lane Config. (Alternative B)



AMERICAN STRUCTUREPOINT INC.

Legend

- 1 Existing Intersection
- 1 Future Intersection
- Traffic Signal
- Stop Control
- Roundabout
- Jersey Street 1-Way EB

SR 32 Reconstruction Westfield, IN

Figure 6.3
Recommended Lane Config. (Alternative C)

6.1 SR 32 & US 31 Interchange

The capacity analysis for all scenarios has shown that the SR 32 & US 31 interchange is expected to operate at an acceptable level of service during the peak hours. No improvements are required.

6.2 SR 32 & Poplar Street / Shamrock Boulevard

The capacity analysis for all scenarios has shown that the intersection of SR 32 & Poplar Street / Shamrock Boulevard is expected to operate at an acceptable level of service during the peak hours as a multi-lane roundabout. No improvements are required.

An extension of Poplar Street south to 161st Street is anticipated to be constructed in the future and will likely be accompanied by development south of the study area. The SR 32 & Poplar Street / Shamrock Boulevard roundabout was built to allow for added capacity on the northbound and southbound approaches by restriping the pavement markings. The potential need for capacity improvements at the roundabout should be studied further if/when the development south of SR 32 materializes.

6.3 SR 32 & Mill Street / Westlea Drive

6.3.1 Design Year 2042 No-Build (Scenario 4)

The capacity analysis for Design Year 2042 No-Build (Scenario 4) has shown that the northbound and southbound approaches at the intersection of SR 32 & Mill Street / Westlea Drive are expected to operate at LOS F during the 2042 AM peak hour.

6.3.2 Design Year 2042 Build (Scenario 5)

With the widening of SR 32 to a four-lane roadway, the capacity analysis has shown that the intersection is expected to operate at an acceptable level of service for Design Year 2042 Build (Scenario 5) with the following geometric recommendations:

- *Design Alternative A*
  - Dedicated eastbound right-turn lane
  - Dedicated eastbound left-turn lane (restrict left turns for all other movements)
- *Design Alternative B*
  - Dedicated eastbound right-turn lane
  - Dedicated eastbound left-turn pocket lane
- *Design Alternative C*
  - Dedicated westbound left-turn pocket lane

6.4 SR 32 & Union Street

6.4.1 Existing Year 2019 (Scenario 1)

The capacity analysis for Existing Year 2019 (Scenario 1) has shown that the intersection of SR 32 & Union Street is expected to operate at an acceptable level of service during the AM and PM peak hours; however,

the 95th percentile queue lengths for the westbound approach (AM) and the eastbound approach (PM) exceed 900 feet during the respective peak hours.

6.4.2 Design Year 2042 No-Build (Scenario 4)

The capacity analysis for Design Year 2042 No-Build (Scenario 4) has shown that the intersection is expected to have multiple approaches that operate at LOS F during the AM and PM peak hours.

6.4.3 Design Year 2042 Build (Scenario 5)

With the widening of SR 32 to a four-lane roadway, the capacity analysis has shown that the intersection is expected to operate at an acceptable level of service for Design Year 2042 Build (Scenario 5) with the following geometric recommendations:

- *Design Alternative A*
  - Dedicated left-turn lanes on all approaches
  - Dedicated right-turn lane on the eastbound approach
- *Design Alternative B*
  - Dedicated northbound right-turn lane
  - Dedicated southbound left-turn lane
  - Dedicated eastbound left-turn lane
  - Dedicated eastbound right-turn lane
- *Design Alternative C*
  - Dedicated northbound left-turn lane
  - Dedicated westbound left-turn lane
  - Dedicated westbound right-turn lane

6.5 SR 32 & Walnut Street

6.5.1 Design Year 2042 No-Build (Scenario 4)

The capacity analysis for Design Year 2042 No-Build (Scenario 4) has shown that the southbound approach at the intersection of SR 32 & Walnut Street is expected to operate at LOS F during the 2042 PM peak hour.

6.5.2 Design Year 2042 Build (Scenario 5)

With the widening of SR 32 to a four-lane roadway, the capacity analysis has shown that the intersection is expected to operate at an acceptable level of service for Design Year 2042 Build (Scenario 5) with the following geometric recommendations:

- *Design Alternative A*
  - Restrict left turns for all movements
- *Design Alternative B*
  - Dedicated eastbound left-turn pocket lane
- *Design Alternative C*
  - Dedicated westbound left-turn pocket lane

6.6 SR 32 & Cherry Street

The capacity analysis for all scenarios has shown that the intersection of SR 32 & Cherry Street is expected to operate at an acceptable level of service during the peak hours.

6.6.1 Design Year 2042 Build (Scenario 5)

With the widening of SR 32 to a four-lane roadway, the capacity analysis has shown that the intersection is expected to operate at an acceptable level of service for Design Year 2042 Build (Scenario 5) with the following geometric recommendations:

- *Design Alternative A*
  - Restrict left turns for all movements
- *Design Alternative B*
  - Dedicated eastbound left-turn pocket lane
- *Design Alternative C*
  - Dedicated westbound left-turn pocket lane

6.7 SR 32 & East Street

6.7.1 Design Year 2042 No-Build (Scenario 4)

The capacity analysis for Design Year 2042 No-Build (Scenario 4) has shown that the southbound approach at the intersection of SR 32 & East Street is expected to operate at LOS F during the 2042 AM and PM peak hours.

6.7.2 Design Year 2042 Build (Scenario 5)

With the widening of SR 32 to a four-lane roadway, the capacity analysis has shown that the intersection is expected to operate at an acceptable level of service for Design Year 2042 Build (Scenario 5). Due to the access management recommendations for Alternative A and the desired transitions to one-way pairs for Alternative B and Alternative C, the intersection of SR 32 & East Street is recommended to be a multi-lane roundabout with the following geometric recommendations:

- *Design Alternative A*
  - Two (2) shared lanes on the eastbound and westbound approaches
  - A single, shared lane on the northbound and southbound approaches
- *Design Alternative B*
  - Two (2) shared lanes on the eastbound approach
  - Shared left/right-turn lane and dedicated right-turn lane on the westbound approach
  - Single, shared lane on the northbound approach
- *Design Alternative C*
  - Two (2) shared lanes on the westbound approach
  - Shared through/right-turn lane and dedicated right-turn lane on the northbound approach
  - Single, shared lane on the southbound approach

6.8 Penn Street & East Street

The capacity analysis for all scenarios has shown that the intersection of Penn Street & East Street is expected to operate at an acceptable level of service during the peak hours.

6.8.1 Design Year 2042 Build (Scenario 5)

With the widening of SR 32 to a four-lane roadway, the capacity analysis has shown that the intersection is expected to operate at an acceptable level of service for Design Year 2042 Build (Scenario 5) with the following geometric recommendations:

- *Design Alternative A*
  - The alignment does not impact the intersection
- *Design Alternative B*
  - Dedicated westbound right-turn lane
- *Design Alternative C*
  - The alignment does not impact the intersection

6.9 Penn Street & Union Street

The capacity analysis for all scenarios has shown that the intersection of Penn Street & Union Street is expected to operate at an acceptable level of service during the peak hours.

6.9.1 Design Year 2042 Build (Scenario 5)

With the widening of SR 32 to a four-lane roadway, the capacity analysis has shown that the intersection is expected to operate at an acceptable level of service for Design Year 2042 Build (Scenario 5) with the following geometric recommendations:

- *Design Alternative A*
  - The alignment does not impact the intersection
- *Design Alternative B*
  - Install traffic signal
  - Dedicated northbound left-turn lane
  - Dedicated westbound left-turn
  - Dedicated westbound right-turn lane
- *Design Alternative C*
  - The alignment does not impact the intersection

6.10 Jersey Street & Union Street

The capacity analysis for all scenarios has shown that the intersection of Jersey Street & Union Street is expected to operate at an acceptable level of service during the peak hours.

6.10.1 Design Year 2042 Build (Scenario 5)

With the widening of SR 32 to a four-lane roadway, the capacity analysis has shown that the intersection is expected to operate at an acceptable level of service for Design Year 2042 Build (Scenario 5) with the following geometric recommendations:

- *Design Alternative A*
  - The alignment does not impact the intersection
- *Design Alternative B*
  - The alignment does not impact the intersection
- *Design Alternative C*
  - Install traffic signal
  - Dedicated northbound right-turn lane
  - Dedicated southbound left-turn lane
  - Dedicated eastbound left-turn lane
  - Dedicated eastbound right-turn lane

6.11 Jersey Street & Cherry Street

The capacity analysis for all scenarios has shown that the intersection of Jersey Street & Cherry Street is expected to operate at an acceptable level of service during the peak hours.

6.11.1 Design Year 2042 Build (Scenario 5)

With the widening of SR 32 to a four-lane roadway, the capacity analysis has shown that the intersection is expected to operate at an acceptable level of service for Design Year 2042 Build (Scenario 5) with the following geometric recommendations:

- *Design Alternative A*
  - The alignment does not impact the intersection
- *Design Alternative B*
  - The alignment does not impact the intersection
- *Design Alternative C*
  - Dedicated eastbound left-turn pocket lane

Table 6.2 – Capacity Analysis Results for Scenario 1: Existing Year (2019 AM)

No.	Intersection	Control Type	Parameter	Approach				
				NB	SB	EB	WB	Ovr
1	SR 32 & US 31	Signal	LOS	C	B	C	C	**C**
			Delay (sec/veh)	25.0	10.3	22.5	30.3	**24.3**
			95th % Queue Length (ft)	125	50	200	225	--
2	SR 32 & Poplar St/Shamrock Blvd	RAB	LOS	B	A	A	A	**A**
			Delay (sec/veh)	10.4	8.7	6.9	7.7	**7.6**
			95th % Queue Length (ft)	25	75	100	125	--
3	SR 32 & Mill St/Westlea Dr	TWSC	LOS	E	D	A	A	**A**
			Delay (sec/veh)	39.4	29.5	0.1	0.1	**0.9**
			95th % Queue Length (ft)	25	25	0	0	--
4	SR 32 & Union St	Signal	LOS	E	E	B	D	**D**
			Delay (sec/veh)	62.6	72.6	19.8	50.6	**44.0**
			95th % Queue Length (ft)	225	275	475	975	--
5	SR 32 & Walnut St	TWSC	LOS	C	C	A	A	**A**
			Delay (sec/veh)	24.3	16.2	0.0	0.0	**0.2**
			95th % Queue Length (ft)	25	25	0	0	--
6	SR 32 & Cherry St	TWSC	LOS	C	C	A	A	**A**
			Delay (sec/veh)	21.2	16.8	0.1	0.3	**0.8**
			95th % Queue Length (ft)	25	25	0	0	--
7	SR 32 & East St	OWSC	LOS		D	A	A	**A**
			Delay (sec/veh)		32.5	0.9	0.0	**1.8**
			95th % Queue Length (ft)		50	0	0	--
8	Penn St & East St	OWSC	LOS	A	A	B		**A**
			Delay (sec/veh)	0.5	0.0	11.0		**1.2**
			95th % Queue Length (ft)	0	0	25		--
9	Penn St & Union St	TWSC	LOS	A	A	A	B	**A**
			Delay (sec/veh)	0.0	0.3	0.0	13.0	**1.4**
			95th % Queue Length (ft)	0	0	0	25	--
10	Jersey St & Union St	OWSC	LOS	A	A	B		**A**
			Delay (sec/veh)	0.3	0.0	10.5		**0.6**
			95th % Queue Length (ft)	0	0	25		--
11	Jersey St (future) & Cherry St	N/A	LOS					
			Delay (sec/veh)					
			95th % Queue Length (ft)					

RAB = Roundabout, TWSC = Two-Way Stop Control, OWSC = One-Way Stop Control

XXX indicates the MOE does not meet the criteria thresholds

Table 6.3 – Capacity Analysis Results for Scenario 1: Existing Year (2019 PM)

No.	Intersection	Control Type	Parameter	Approach				
				NB	SB	EB	WB	Ovr
1	SR 32 & US 31	Signal	LOS	C	B	C	D	**C**
			Delay (sec/veh)	22.1	13.6	25.6	37.0	**26.2**
			95th % Queue Length (ft)	200	50	250	200	--
2	SR 32 & Poplar St/Shamrock Blvd	RAB	LOS	B	A	A	A	**A**
			Delay (sec/veh)	11.1	7.0	4.2	4.1	**4.6**
			95th % Queue Length (ft)	25	25	75	25	--
3	SR 32 & Mill St/Westlea Dr	TWSC	LOS	D	C	A	A	**A**
			Delay (sec/veh)	26.6	24.8	0.1	0.3	**0.9**
			95th % Queue Length (ft)	25	25	0	0	--
4	SR 32 & Union St	Signal	LOS	E	D	C	C	**C**
			Delay (sec/veh)	66.8	51.0	27.6	22.7	**34.2**
			95th % Queue Length (ft)	300	200	900	550	--
5	SR 32 & Walnut St	TWSC	LOS	C	D	A	A	**A**
			Delay (sec/veh)	19.2	34.3	0.0	0.1	**0.4**
			95th % Queue Length (ft)	25	25	0	0	--
6	SR 32 & Cherry St	TWSC	LOS	D	C	A	A	**A**
			Delay (sec/veh)	26.5	17.9	0.0	0.3	**0.6**
			95th % Queue Length (ft)	25	25	0	0	--
7	SR 32 & East St	OWSC	LOS		E	A	A	**A**
			Delay (sec/veh)		40.2	0.2	0.0	**1.0**
			95th % Queue Length (ft)		25	0	0	--
8	Penn St & East St	OWSC	LOS	A	A	A		**A**
			Delay (sec/veh)	0.5	0.0	9.4		**1.6**
			95th % Queue Length (ft)	0	0	25		--
9	Penn St & Union St	TWSC	LOS	A	A	A	B	**A**
			Delay (sec/veh)	0.0	0.2	0.0	12.2	**0.9**
			95th % Queue Length (ft)	0	0	0	25	--
10	Jersey St & Union St	OWSC	LOS	A	A	B		**A**
			Delay (sec/veh)	0.3	0.0	11.7		**1.0**
			95th % Queue Length (ft)	0	0	25		--
11	Jersey St (future) & Cherry St	N/A	LOS					
			Delay (sec/veh)					
			95th % Queue Length (ft)					

RAB = Roundabout, TWSC = Two-Way Stop Control, OWSC = One-Way Stop Control

XXX indicates the MOE does not meet the criteria thresholds

Table 6.4 – Capacity Analysis Results for Scenario 2: Opening Year No-Build (2022 AM)

No.	Intersection	Control Type	Parameter	Approach				
				NB	SB	EB	WB	Ovr
1	SR 32 & US 31	Signal	LOS	C	A	C	C	**C**
			Delay (sec/veh)	30.0	8.8	24.3	32.0	**26.3**
			95th % Queue Length (ft)	275	50	250	225	--
2	SR 32 & Poplar St/Shamrock Blvd	RAB	LOS	B	A	A	A	**A**
			Delay (sec/veh)	10.8	9.6	7.0	9.4	**8.5**
			95th % Queue Length (ft)	25	100	100	175	--
3	SR 32 & Mill St/Westlea Dr	TWSC	LOS	F	E	A	A	**A**
			Delay (sec/veh)	52.5	35.6	0.1	0.1	**1.1**
			95th % Queue Length (ft)	25	25	0	0	--
4	SR 32 & Union St	Signal	LOS	E	E	C	F	**E**
			Delay (sec/veh)	61.7	75.8	24.5	81.0	**59.0**
			95th % Queue Length (ft)	225	300	500	1,100	--
5	SR 32 & Walnut St	TWSC	LOS	D	C	A	A	**A**
			Delay (sec/veh)	28.0	17.5	0.0	0.0	**0.2**
			95th % Queue Length (ft)	25	25	0	0	--
6	SR 32 & Cherry St	TWSC	LOS	C	C	A	A	**A**
			Delay (sec/veh)	24.1	18.3	0.1	0.3	**0.8**
			95th % Queue Length (ft)	25	25	0	0	--
7	SR 32 & East St	OWSC	LOS		E	A	A	**A**
			Delay (sec/veh)		42.2	0.9	0.0	**2.2**
			95th % Queue Length (ft)		50	0	0	--
8	Penn St & East St	OWSC	LOS	A	A	B		**A**
			Delay (sec/veh)	0.5	0.0	11.2		**1.2**
			95th % Queue Length (ft)	0	0	25		--
9	Penn St & Union St	TWSC	LOS	A	A	A	B	**A**
			Delay (sec/veh)	0.0	0.3	0.0	13.4	**1.4**
			95th % Queue Length (ft)	0	0	0	25	--
10	Jersey St & Union St	OWSC	LOS	A	A	B		**A**
			Delay (sec/veh)	0.3	0.0	10.6		**0.6**
			95th % Queue Length (ft)	0	0	25		--
11	Jersey St (future) & Cherry St	N/A	LOS					
			Delay (sec/veh)					
			95th % Queue Length (ft)					

RAB = Roundabout, TWSC = Two-Way Stop Control, OWSC = One-Way Stop Control

XXX indicates the MOE does not meet the criteria thresholds

Table 6.5 – Capacity Analysis Results for Scenario 2: Opening Year No-Build (2022 PM)

No.	Intersection	Control Type	Parameter	Approach				
				NB	SB	EB	WB	Ovr
1	SR 32 & US 31	Signal	LOS	C	A	C	D	**C**
			Delay (sec/veh)	27.5	7.0	22.2	36.0	**25.2**
			95th % Queue Length (ft)	400	50	225	225	--
2	SR 32 & Poplar St/Shamrock Blvd	RAB	LOS	B	A	A	A	**A**
			Delay (sec/veh)	11.6	7.2	4.3	4.2	**4.7**
			95th % Queue Length (ft)	25	25	75	50	--
3	SR 32 & Mill St/Westlea Dr	TWSC	LOS	E	D	A	A	**A**
			Delay (sec/veh)	40.8	32.6	0.1	0.3	**1.2**
			95th % Queue Length (ft)	25	25	0	0	--
4	SR 32 & Union St	Signal	LOS	E	D	C	C	**D**
			Delay (sec/veh)	74.1	54.9	32.8	26.1	**38.5**
			95th % Queue Length (ft)	375	250	1,100	625	--
5	SR 32 & Walnut St	TWSC	LOS	C	E	A	A	**A**
			Delay (sec/veh)	22.3	45.6	0.0	0.1	**0.5**
			95th % Queue Length (ft)	25	25	0	0	--
6	SR 32 & Cherry St	TWSC	LOS	D	C	A	A	**A**
			Delay (sec/veh)	34.2	21.8	0.0	0.3	**0.7**
			95th % Queue Length (ft)	25	25	0	0	--
7	SR 32 & East St	OWSC	LOS		F	A	A	**A**
			Delay (sec/veh)		63.4	0.2	0.0	**1.6**
			95th % Queue Length (ft)		50	0	0	--
8	Penn St & East St	OWSC	LOS	A	A	A		**A**
			Delay (sec/veh)	0.5	0.0	9.5		**1.5**
			95th % Queue Length (ft)	0	0	25		--
9	Penn St & Union St	TWSC	LOS	A	A	A	B	**A**
			Delay (sec/veh)	0.0	0.1	0.0	12.6	**0.9**
			95th % Queue Length (ft)	0	0	0	25	--
10	Jersey St & Union St	OWSC	LOS	A	A	B		**A**
			Delay (sec/veh)	0.3	0.0	11.9		**1.0**
			95th % Queue Length (ft)	0	0	25		--
11	Jersey St (future) & Cherry St	N/A	LOS					
			Delay (sec/veh)					
			95th % Queue Length (ft)					

RAB = Roundabout, TWSC = Two-Way Stop Control, OWSC = One-Way Stop Control

XXX indicates the MOE does not meet the criteria thresholds

Table 6.6 – Capacity Analysis Results for Scenario 3A: Opening Year Build (2022 AM)

No.	Intersection	Control Type	Parameter	Approach				
				NB	SB	EB	WB	Ovr
1	SR 32 & US 31	Signal	LOS	D	B	C	D	**C**
			Delay (sec/veh)	38.1	10.0	26.6	37.3	**31.0**
			95th % Queue Length (ft)	375	75	325	300	--
2	SR 32 & Poplar St/Shamrock Blvd	RAB	LOS	B	B	A	B	**A**
			Delay (sec/veh)	12.2	10.1	7.0	11.8	**9.6**
			95th % Queue Length (ft)	25	100	125	200	--
3	SR 32 & Mill St/Westlea Dr	TWSC	LOS	B	B	A	A	**A**
			Delay (sec/veh)	11.5	13.7	0.1	0.0	**0.3**
			95th % Queue Length (ft)	25	25	0	0	--
4	SR 32 & Union St	Signal	LOS	D	D	B	B	**C**
			Delay (sec/veh)	40.9	43.8	16.0	19.2	**23.4**
			95th % Queue Length (ft)	175	200	200	300	--
5	SR 32 & Walnut St	TWSC	LOS	B	B	A	A	**A**
			Delay (sec/veh)	12.4	12.1	0.0	0.0	**0.1**
			95th % Queue Length (ft)	25	25	0	0	--
6	SR 32 & Cherry St	TWSC	LOS	B	B	A	A	**A**
			Delay (sec/veh)	12.0	12.8	0.0	0.0	**0.3**
			95th % Queue Length (ft)	25	25	0	0	--
7	SR 32 & East St	RAB	LOS	A	A	A	A	**A**
			Delay (sec/veh)	6.7	7.1	4.1	3.9	**4.1**
			95th % Queue Length (ft)	25	25	25	50	--
8	Penn St & East St	OWSC	LOS	A	A	B		**A**
			Delay (sec/veh)	0.6	0.0	11.4		**1.2**
			95th % Queue Length (ft)	0	0	25		--
9	Penn St & Union St	TWSC	LOS	A	A	A	B	**A**
			Delay (sec/veh)	0.0	0.3	0.0	13.5	**1.4**
			95th % Queue Length (ft)	0	0	0	25	--
10	Jersey St & Union St	TWSC	LOS	A	A	B	B	**A**
			Delay (sec/veh)	0.3	0.0	10.7	11.5	**0.6**
			95th % Queue Length (ft)	0	0	25	25	--
11	Jersey St (future) & Cherry St	TWSC	LOS	A	A	A	A	**A**
			Delay (sec/veh)	9.2	9.2	0.0	0.0	**8.1**
			95th % Queue Length (ft)	25	25	0	0	--

RAB = Roundabout, TWSC = Two-Way Stop Control, OWSC = One-Way Stop Control

XXX indicates the MOE does not meet the criteria thresholds

Table 6.7 – Capacity Analysis Results for Scenario 3A: Opening Year Build (2022 PM)

No.	Intersection	Control Type	Parameter	Approach				
				NB	SB	EB	WB	Ovr
1	SR 32 & US 31	Signal	LOS	C	B	C	D	**C**
			Delay (sec/veh)	31.1	11.7	28.9	48.7	**32.3**
			95th % Queue Length (ft)	500	75	350	325	--
2	SR 32 & Poplar St/Shamrock Blvd	RAB	LOS	B	A	A	A	**A**
			Delay (sec/veh)	12.5	7.6	4.4	4.8	**5.2**
			95th % Queue Length (ft)	25	25	100	50	--
3	SR 32 & Mill St/Westlea Dr	TWSC	LOS	B	B	A	A	**A**
			Delay (sec/veh)	12.7	11.6	0.1	0.0	**0.3**
			95th % Queue Length (ft)	25	25	0	0	--
4	SR 32 & Union St	Signal	LOS	D	C	C	B	**C**
			Delay (sec/veh)	37.3	31.4	22.2	19.5	**24.9**
			95th % Queue Length (ft)	275	150	300	200	--
5	SR 32 & Walnut St	TWSC	LOS	B	B	A	A	**A**
			Delay (sec/veh)	13.4	11.1	0.0	0.0	**0.2**
			95th % Queue Length (ft)	25	25	0	0	--
6	SR 32 & Cherry St	TWSC	LOS	B	B	A	A	**A**
			Delay (sec/veh)	14.4	11.2	0.0	0.0	**0.4**
			95th % Queue Length (ft)	25	25	0	0	--
7	SR 32 & East St	RAB	LOS	A	A	A	A	**A**
			Delay (sec/veh)	7.8	8.0	3.8	3.7	**3.9**
			95th % Queue Length (ft)	25	25	75	50	--
8	Penn St & East St	OWSC	LOS	A	A	A		**A**
			Delay (sec/veh)	0.7	0.0	9.6		**1.6**
			95th % Queue Length (ft)	0	0	25		--
9	Penn St & Union St	TWSC	LOS	A	A	A	B	**A**
			Delay (sec/veh)	0.0	0.1	0.0	12.8	**0.9**
			95th % Queue Length (ft)	0	0	0	25	--
10	Jersey St & Union St	TWSC	LOS	A	A	B	B	**A**
			Delay (sec/veh)	0.3	0.0	12.1	10.9	**1.1**
			95th % Queue Length (ft)	0	0	25	25	--
11	Jersey St (future) & Cherry St	TWSC	LOS	A	A	A	A	**A**
			Delay (sec/veh)	9.2	9.2	0.0	0.0	**7.8**
			95th % Queue Length (ft)	25	25	0	0	--

RAB = Roundabout, TWSC = Two-Way Stop Control, OWSC = One-Way Stop Control

XXX indicates the MOE does not meet the criteria thresholds

Table 6.8 – Capacity Analysis Results for Scenario 3B: Opening Year Build (2022 AM)

No.	Intersection	Control Type	Parameter	Approach				
				NB	SB	EB	WB	Ovr
1	SR 32 & US 31	Signal	LOS	D	B	C	D	**C**
			Delay (sec/veh)	38.1	10.0	26.6	37.3	**31.0**
			95th % Queue Length (ft)	375	75	325	300	--
2	SR 32 & Poplar St/Shamrock Blvd	RAB	LOS	B	B	A	B	**A**
			Delay (sec/veh)	12.2	10.1	6.9	11.7	**9.5**
			95th % Queue Length (ft)	25	100	125	200	--
3	SR 32 & Mill St/Westlea Dr	TWSC	LOS	B	C	A		**A**
			Delay (sec/veh)	13.1	19.5	0.0		**0.6**
			95th % Queue Length (ft)	25	25	0		--
4	SR 32 & Union St	Signal	LOS	C	B	B		**B**
			Delay (sec/veh)	29.3	17.1	10.2		**14.9**
			95th % Queue Length (ft)	125	75	150		--
5	SR 32 & Walnut St	TWSC	LOS	B	C	A		**A**
			Delay (sec/veh)	12.4	17.0	0.0		**0.3**
			95th % Queue Length (ft)	25	25	0		--
6	SR 32 & Cherry St	TWSC	LOS	B	C	A		**A**
			Delay (sec/veh)	12.0	16.5	0.0		**1.4**
			95th % Queue Length (ft)	25	25	0		--
7	SR 32 & East St	RAB	LOS	A		A	A	**A**
			Delay (sec/veh)	5.1		4.1	4.2	**4.2**
			95th % Queue Length (ft)	25		25	50	--
8	Penn St & East St	OWSC	LOS		C		A	**A**
			Delay (sec/veh)		17.2		0.0	**1.8**
			95th % Queue Length (ft)		50		0	--
9	Penn St & Union St	Signal	LOS	A	B		B	**B**
			Delay (sec/veh)	8.9	16.1		19.8	**17.0**
			95th % Queue Length (ft)	125	200		200	--
10	Jersey St & Union St	TWSC	LOS	A	A	B	A	**A**
			Delay (sec/veh)	0.3	0.0	10.9	9.6	**1.0**
			95th % Queue Length (ft)	0	0	25	25	--
11	Jersey St (future) & Cherry St	TWSC	LOS	A	A	A	A	**A**
			Delay (sec/veh)	0.2	0.0	8.5	9.3	**2.5**
			95th % Queue Length (ft)	0	0	25	25	--

RAB = Roundabout, TWSC = Two-Way Stop Control, OWSC = One-Way Stop Control

XXX indicates the MOE does not meet the criteria thresholds

Table 6.9 – Capacity Analysis Results for Scenario 3B: Opening Year Build (2022 PM)

No.	Intersection	Control Type	Parameter	Approach				
				NB	SB	EB	WB	Ovr
1	SR 32 & US 31	Signal	LOS	C	B	C	D	**C**
			Delay (sec/veh)	31.1	11.7	28.9	48.7	**32.3**
			95th % Queue Length (ft)	500	75	350	325	--
2	SR 32 & Poplar St/Shamrock Blvd	RAB	LOS	B	A	A	A	**A**
			Delay (sec/veh)	12.6	7.7	4.3	5.0	**5.4**
			95th % Queue Length (ft)	25	25	100	50	--
3	SR 32 & Mill St/Westlea Dr	TWSC	LOS	B	D	A		**A**
			Delay (sec/veh)	14.8	26.6	0.0		**0.9**
			95th % Queue Length (ft)	25	25	0		--
4	SR 32 & Union St	Signal	LOS	C	B	B		**B**
			Delay (sec/veh)	29.7	18.9	12.0		**17.0**
			95th % Queue Length (ft)	150	125	225		--
5	SR 32 & Walnut St	TWSC	LOS	B	C	A		**A**
			Delay (sec/veh)	13.7	22.6	0.0		**0.5**
			95th % Queue Length (ft)	25	25	0		--
6	SR 32 & Cherry St	TWSC	LOS	C	C	A		**A**
			Delay (sec/veh)	15.4	23.9	0.0		**1.3**
			95th % Queue Length (ft)	25	25	0		--
7	SR 32 & East St	RAB	LOS	A		A	A	**A**
			Delay (sec/veh)	6.3		3.8	4.3	**4.0**
			95th % Queue Length (ft)	25		75	50	--
8	Penn St & East St	OWSC	LOS		A		B	**A**
			Delay (sec/veh)		0.0		11.7	**0.9**
			95th % Queue Length (ft)		0		25	--
9	Penn St & Union St	Signal	LOS	A	A		C	**B**
			Delay (sec/veh)	5.0	8.6		23.6	**15.7**
			95th % Queue Length (ft)	150	125		150	--
10	Jersey St & Union St	TWSC	LOS	A	A	B	B	**A**
			Delay (sec/veh)	0.3	0.0	12.8	10.3	**1.6**
			95th % Queue Length (ft)	0	0	25	25	--
11	Jersey St (future) & Cherry St	TWSC	LOS	A	A	A	A	**A**
			Delay (sec/veh)	0.3	0.4	8.5	9.5	**4.6**
			95th % Queue Length (ft)	0	0	25	25	--

RAB = Roundabout, TWSC = Two-Way Stop Control, OWSC = One-Way Stop Control
XXX indicates the MOE does not meet the criteria thresholds

Table 6.10 – Capacity Analysis Results for Scenario 3C: Opening Year Build (2022 AM)

No.	Intersection	Control Type	Parameter	Approach				
				NB	SB	EB	WB	Ovr
1	SR 32 & US 31	Signal	LOS	D	B	C	D	**C**
			Delay (sec/veh)	38.1	10.0	26.6	37.3	**31.0**
			95th % Queue Length (ft)	375	75	325	300	--
2	SR 32 & Poplar St/Shamrock Blvd	RAB	LOS	B	B	A	B	**A**
			Delay (sec/veh)	11.1	10.5	6.9	10.5	**9.0**
			95th % Queue Length (ft)	25	100	125	200	--
3	SR 32 & Mill St/Westlea Dr	TWSC	LOS	C	C		A	**A**
			Delay (sec/veh)	19.5	15.6		0.0	**1.4**
			95th % Queue Length (ft)	25	25		0	--
4	SR 32 & Union St	Signal	LOS	B	D		B	**B**
			Delay (sec/veh)	16.4	35.9		14.8	**19.0**
			95th % Queue Length (ft)	125	175		225	--
5	SR 32 & Walnut St	TWSC	LOS	B	B		A	**A**
			Delay (sec/veh)	13.6	12.1		0.0	**0.1**
			95th % Queue Length (ft)	25	25		0	--
6	SR 32 & Cherry St	TWSC	LOS	C	B		A	**A**
			Delay (sec/veh)	20.1	12.3		0.0	**0.3**
			95th % Queue Length (ft)	25	25		0	--
7	SR 32 & East St	RAB	LOS	A	A		A	**A**
			Delay (sec/veh)	3.6	7.1		3.6	**3.7**
			95th % Queue Length (ft)	25	25		50	--
8	Penn St & East St	OWSC	LOS	A	A	B		**A**
			Delay (sec/veh)	0.5	0.0	11.2		**1.2**
			95th % Queue Length (ft)	0	0	25		--
9	Penn St & Union St	TWSC	LOS	A	A	A	B	**A**
			Delay (sec/veh)	0.0	0.2	0.0	13.4	**1.4**
			95th % Queue Length (ft)	0	0	0	25	--
10	Jersey St & Union St	Signal	LOS	B	A	C		**B**
			Delay (sec/veh)	16.3	1.8	20.8		**17.1**
			95th % Queue Length (ft)	125	25	150		--
11	Jersey St (future) & Cherry St	TWSC	LOS	B	C	A		**A**
			Delay (sec/veh)	12.2	17.7	0.0		**1.2**
			95th % Queue Length (ft)	25	25	0		--

RAB = Roundabout, TWSC = Two-Way Stop Control, OWSC = One-Way Stop Control

XXX indicates the MOE does not meet the criteria thresholds

Table 6.11 – Capacity Analysis Results for Scenario 3C: Opening Year Build (2022 PM)

No.	Intersection	Control Type	Parameter	Approach				
				NB	SB	EB	WB	Ovr
1	SR 32 & US 31	Signal	LOS	C	B	C	D	**C**
			Delay (sec/veh)	31.1	11.7	28.9	48.7	**32.3**
			95th % Queue Length (ft)	500	75	350	325	--
2	SR 32 & Poplar St/Shamrock Blvd	RAB	LOS	B	A	A	A	**A**
			Delay (sec/veh)	11.9	7.5	4.3	4.3	**4.7**
			95th % Queue Length (ft)	25	25	100	50	--
3	SR 32 & Mill St/Westlea Dr	TWSC	LOS	C	B		A	**A**
			Delay (sec/veh)	16.6	13.4		0.0	**1.7**
			95th % Queue Length (ft)	25	25		0	--
4	SR 32 & Union St	Signal	LOS	B	C		B	**B**
			Delay (sec/veh)	18.7	33.3		11.7	**17.9**
			95th % Queue Length (ft)	125	175		125	--
5	SR 32 & Walnut St	TWSC	LOS	C	B		A	**A**
			Delay (sec/veh)	17.3	13.2		0.0	**0.2**
			95th % Queue Length (ft)	25	25		0	--
6	SR 32 & Cherry St	TWSC	LOS	B	B		A	**A**
			Delay (sec/veh)	14.4	11.6		0.0	**0.3**
			95th % Queue Length (ft)	25	25		0	--
7	SR 32 & East St	RAB	LOS	A	A		A	**A**
			Delay (sec/veh)	3.6	7.9		3.5	**3.7**
			95th % Queue Length (ft)	75	25		50	--
8	Penn St & East St	OWSC	LOS	A	A	A		**A**
			Delay (sec/veh)	0.5	0.0	9.6		**1.5**
			95th % Queue Length (ft)	0	0	25		--
9	Penn St & Union St	TWSC	LOS	A	A	A	B	**A**
			Delay (sec/veh)	0.0	0.1	0.0	12.6	**0.9**
			95th % Queue Length (ft)	0	0	0	25	--
10	Jersey St & Union St	Signal	LOS	C	A	B		**B**
			Delay (sec/veh)	20.1	2.9	19.5		**17.1**
			95th % Queue Length (ft)	175	25	225		--
11	Jersey St (future) & Cherry St	TWSC	LOS	C	D	A		**A**
			Delay (sec/veh)	15.5	25.6	0.0		**0.9**
			95th % Queue Length (ft)	25	25	0		--

RAB = Roundabout, TWSC = Two-Way Stop Control, OWSC = One-Way Stop Control

XXX indicates the MOE does not meet the criteria thresholds

Table 6.12 – Capacity Analysis Results for Scenario 4: Design Year No-Build (2042 AM)

No.	Intersection	Control Type	Parameter	Approach				
				NB	SB	EB	WB	Ovr
1	SR 32 & US 31	Signal	LOS	D	A	C	D	**C**
			Delay (sec/veh)	37.9	8.6	33.0	42.8	**34.5**
			95th % Queue Length (ft)	350	50	325	325	--
2	SR 32 & Poplar St/Shamrock Blvd	RAB	LOS	B	B	A	B	**B**
			Delay (sec/veh)	11.2	12.1	7.1	13.3	**10.5**
			95th % Queue Length (ft)	25	150	125	275	--
3	SR 32 & Mill St/Westlea Dr	TWSC	LOS	F	F	A	A	**A**
			Delay (sec/veh)	159.3	62.1	0.1	0.1	**2.4**
			95th % Queue Length (ft)	50	50	0	0	--
4	SR 32 & Union St	Signal	LOS	F	F	D	F	**F**
			Delay (sec/veh)	111.5	140.9	39.9	109.1	**89.4**
			95th % Queue Length (ft)	375	475	650	1,475	--
5	SR 32 & Walnut St	TWSC	LOS	E	C	A	A	**A**
			Delay (sec/veh)	38.3	21.2	0.0	0.0	**0.3**
			95th % Queue Length (ft)	25	25	0	0	--
6	SR 32 & Cherry St	TWSC	LOS	E	C	A	A	**A**
			Delay (sec/veh)	35.9	22.3	0.1	0.3	**1.1**
			95th % Queue Length (ft)	25	25	0	0	--
7	SR 32 & East St	OWSC	LOS		F	A	A	**A**
			Delay (sec/veh)		121.7	1.1	0.0	**5.7**
			95th % Queue Length (ft)		125	25	0	--
8	Penn St & East St	OWSC	LOS	A	A	B		**A**
			Delay (sec/veh)	0.5	0.0	12.0		**1.2**
			95th % Queue Length (ft)	0	0	25		--
9	Penn St & Union St	TWSC	LOS	A	A	A	C	**A**
			Delay (sec/veh)	0.0	0.3	0.0	15.4	**1.6**
			95th % Queue Length (ft)	0	0	0	25	--
10	Jersey St & Union St	OWSC	LOS	A	A	B		**A**
			Delay (sec/veh)	0.3	0.0	11.1		**0.6**
			95th % Queue Length (ft)	0	0	25		--
11	Jersey St (future) & Cherry St	N/A	LOS					
			Delay (sec/veh)					
			95th % Queue Length (ft)					

RAB = Roundabout, TWSC = Two-Way Stop Control, OWSC = One-Way Stop Control

XXX indicates the MOE does not meet the criteria thresholds

Table 6.13 – Capacity Analysis Results for Scenario 4: Design Year No-Build (2042 PM)

No.	Intersection	Control Type	Parameter	Approach				
				NB	SB	EB	WB	Ovr
1	SR 32 & US 31	Signal	LOS	C	A	C	D	**C**
			Delay (sec/veh)	34.7	7.8	32.6	48.8	**34.4**
			95th % Queue Length (ft)	475	50	300	275	--
2	SR 32 & Poplar St/Shamrock Blvd	RAB	LOS	B	A	A	A	**A**
			Delay (sec/veh)	11.6	7.1	4.3	4.2	**4.7**
			95th % Queue Length (ft)	25	25	100	50	--
3	SR 32 & Mill St/Westlea Dr	TWSC	LOS	F	F	A	A	**A**
			Delay (sec/veh)	82.8	62.9	0.1	0.3	**2.2**
			95th % Queue Length (ft)	50	25	0	0	--
4	SR 32 & Union St	Signal	LOS	F	D	F	D	**E**
			Delay (sec/veh)	86.7	53.3	82.1	38.5	**65.8**
			95th % Queue Length (ft)	450	250	1,375	875	--
5	SR 32 & Walnut St	TWSC	LOS	D	F	A	A	**A**
			Delay (sec/veh)	29.3	92.8	0.0	0.1	**0.8**
			95th % Queue Length (ft)	25	25	0	0	--
6	SR 32 & Cherry St	TWSC	LOS	F	D	A	A	**A**
			Delay (sec/veh)	53.8	29.6	0.0	0.4	**1.1**
			95th % Queue Length (ft)	25	25	0	0	--
7	SR 32 & East St	OWSC	LOS		F	A	A	**A**
			Delay (sec/veh)		239.2	0.3	0.0	**5.6**
			95th % Queue Length (ft)		125	0	0	--
8	Penn St & East St	OWSC	LOS	A	A	A		**A**
			Delay (sec/veh)	0.5	0.0	9.7		**1.6**
			95th % Queue Length (ft)	0	0	25		--
9	Penn St & Union St	TWSC	LOS	A	A	A	B	**A**
			Delay (sec/veh)	0.0	0.2	0.0	14.1	**1.0**
			95th % Queue Length (ft)	0	0	0	25	--
10	Jersey St & Union St	OWSC	LOS	A	A	B		**A**
			Delay (sec/veh)	0.3	0.0	13.0		**1.1**
			95th % Queue Length (ft)	0	0	25		--
11	Jersey St (future) & Cherry St	N/A	LOS					
			Delay (sec/veh)					
			95th % Queue Length (ft)					

RAB = Roundabout, TWSC = Two-Way Stop Control, OWSC = One-Way Stop Control
XXX indicates the MOE does not meet the criteria thresholds

Table 6.14 – Capacity Analysis Results for Scenario 5A: Design Year Build (2042 AM)

No.	Intersection	Control Type	Parameter	Approach				
				NB	SB	EB	WB	Ovr
1	SR 32 & US 31	Signal	LOS	D	B	C	D	**D**
			Delay (sec/veh)	46.8	10.9	33.0	44.6	**37.6**
			95th % Queue Length (ft)	425	75	400	400	--
2	SR 32 & Poplar St/Shamrock Blvd	RAB	LOS	B	B	A	B	**B**
			Delay (sec/veh)	12.8	12.5	7.1	18.8	**12.7**
			95th % Queue Length (ft)	50	150	150	400	--
3	SR 32 & Mill St/Westlea Dr	TWSC	LOS	B	C	A	A	**A**
			Delay (sec/veh)	12.4	15.6	0.1	0.0	**0.4**
			95th % Queue Length (ft)	25	25	0	0	--
4	SR 32 & Union St	Signal	LOS	D	D	B	C	**C**
			Delay (sec/veh)	42.9	48.7	18.8	25.2	**27.7**
			95th % Queue Length (ft)	200	250	225	375	--
5	SR 32 & Walnut St	TWSC	LOS	B	B	A	A	**A**
			Delay (sec/veh)	13.4	13.2	0.0	0.0	**0.1**
			95th % Queue Length (ft)	25	25	0	0	--
6	SR 32 & Cherry St	TWSC	LOS	B	B	A	A	**A**
			Delay (sec/veh)	13.1	14.1	0.0	0.0	**0.3**
			95th % Queue Length (ft)	25	25	0	0	--
7	SR 32 & East St	RAB	LOS	A	A	A	A	**A**
			Delay (sec/veh)	6.7	6.9	4.1	3.9	**4.1**
			95th % Queue Length (ft)	25	25	50	50	--
8	Penn St & East St	OWSC	LOS	A	A	B		**A**
			Delay (sec/veh)	0.7	0.0	12.2		**1.3**
			95th % Queue Length (ft)	0	0	25		--
9	Penn St & Union St	TWSC	LOS	A	A	A	C	**A**
			Delay (sec/veh)	0.0	0.3	0.0	15.6	**1.6**
			95th % Queue Length (ft)	0	0	0	25	--
10	Jersey St & Union St	TWSC	LOS	A	A	B	B	**A**
			Delay (sec/veh)	0.3	0.0	11.3	12.1	**0.7**
			95th % Queue Length (ft)	0	0	25	25	--
11	Jersey St (future) & Cherry St	TWSC	LOS	A	A	A	A	**A**
			Delay (sec/veh)	9.3	9.2	0.0	0.0	**8.3**
			95th % Queue Length (ft)	25	25	0	0	--

RAB = Roundabout, TWSC = Two-Way Stop Control, OWSC = One-Way Stop Control

XXX indicates the MOE does not meet the criteria thresholds

Table 6.15 – Capacity Analysis Results for Scenario 5A: Design Year Build (2042 PM)

No.	Intersection	Control Type	Parameter	Approach				
				NB	SB	EB	WB	Ovr
1	SR 32 & US 31	Signal	LOS	D	B	D	E	**D**
			Delay (sec/veh)	36.9	12.3	36.2	57.8	**39.0**
			95th % Queue Length (ft)	575	75	450	400	--
2	SR 32 & Poplar St/Shamrock Blvd	RAB	LOS	B	A	A	A	**A**
			Delay (sec/veh)	12.8	7.4	4.4	4.8	**5.2**
			95th % Queue Length (ft)	25	25	100	75	--
3	SR 32 & Mill St/Westlea Dr	TWSC	LOS	B	B	A	A	**A**
			Delay (sec/veh)	14.0	12.4	0.1	0.0	**0.4**
			95th % Queue Length (ft)	25	25	0	0	--
4	SR 32 & Union St	Signal	LOS	D	C	C	C	**C**
			Delay (sec/veh)	50.0	32.0	26.2	23.4	**29.9**
			95th % Queue Length (ft)	350	175	375	250	--
5	SR 32 & Walnut St	TWSC	LOS	C	B	A	A	**A**
			Delay (sec/veh)	15.1	11.7	0.0	0.0	**0.2**
			95th % Queue Length (ft)	25	25	0	0	--
6	SR 32 & Cherry St	TWSC	LOS	C	B	A	A	**A**
			Delay (sec/veh)	16.5	11.9	0.0	0.0	**0.5**
			95th % Queue Length (ft)	25	25	0	0	--
7	SR 32 & East St	RAB	LOS	A	A	A	A	**A**
			Delay (sec/veh)	8.0	7.9	3.7	3.7	**3.8**
			95th % Queue Length (ft)	25	25	75	50	--
8	Penn St & East St	OWSC	LOS	A	A	A		**A**
			Delay (sec/veh)	0.7	0.0	9.8		**1.6**
			95th % Queue Length (ft)	0	0	25		--
9	Penn St & Union St	TWSC	LOS	A	A	A	B	**A**
			Delay (sec/veh)	0.0	0.1	0.0	14.4	**1.0**
			95th % Queue Length (ft)	0	0	0	25	--
10	Jersey St & Union St	TWSC	LOS	A	A	B	B	**A**
			Delay (sec/veh)	0.3	0.0	13.3	11.6	**1.2**
			95th % Queue Length (ft)	0	0	25	25	--
11	Jersey St (future) & Cherry St	TWSC	LOS	A	A	A	A	**A**
			Delay (sec/veh)	9.2	9.3	0.0	0.0	**8.0**
			95th % Queue Length (ft)	25	25	0	0	--

RAB = Roundabout, TWSC = Two-Way Stop Control, OWSC = One-Way Stop Control

XXX indicates the MOE does not meet the criteria thresholds

Table 6.16 – Capacity Analysis Results for Scenario 5B: Design Year Build (2042 AM)

No.	Intersection	Control Type	Parameter	Approach				
				NB	SB	EB	WB	Ovr
1	SR 32 & US 31	Signal	LOS	D	B	C	D	**D**
			Delay (sec/veh)	46.8	10.9	33.0	44.6	**37.6**
			95th % Queue Length (ft)	425	75	400	400	--
2	SR 32 & Poplar St/Shamrock Blvd	RAB	LOS	B	B	A	B	**B**
			Delay (sec/veh)	12.8	12.4	7.1	18.5	**12.5**
			95th % Queue Length (ft)	50	150	150	400	--
3	SR 32 & Mill St/Westlea Dr	TWSC	LOS	B	C	A		**A**
			Delay (sec/veh)	14.8	23.7	0.0		**0.7**
			95th % Queue Length (ft)	25	25	0		--
4	SR 32 & Union St	Signal	LOS	C	B	B		**B**
			Delay (sec/veh)	30.0	15.2	11.7		**15.7**
			95th % Queue Length (ft)	150	75	175		--
5	SR 32 & Walnut St	TWSC	LOS	B	C	A		**A**
			Delay (sec/veh)	13.3	19.9	0.0		**0.3**
			95th % Queue Length (ft)	25	25	0		--
6	SR 32 & Cherry St	TWSC	LOS	B	C	A		**A**
			Delay (sec/veh)	13.0	19.8	0.0		**1.6**
			95th % Queue Length (ft)	25	25	0		--
7	SR 32 & East St	RAB	LOS	A		A	A	**A**
			Delay (sec/veh)	5.0		4.1	4.2	**4.2**
			95th % Queue Length (ft)	25		50	50	--
8	Penn St & East St	OWSC	LOS		C		A	**A**
			Delay (sec/veh)		23.0		0.0	**2.4**
			95th % Queue Length (ft)		75		0	--
9	Penn St & Union St	Signal	LOS	B	C		C	**B**
			Delay (sec/veh)	10.1	21.0		20.3	**18.9**
			95th % Queue Length (ft)	125	250		250	--
10	Jersey St & Union St	TWSC	LOS	A	A	B	A	**A**
			Delay (sec/veh)	0.3	0.0	11.4	9.9	**0.9**
			95th % Queue Length (ft)	0	0	25	25	--
11	Jersey St (future) & Cherry St	TWSC	LOS	A	A	A	A	**A**
			Delay (sec/veh)	0.2	0.0	8.5	9.3	**2.2**
			95th % Queue Length (ft)	0	0	25	25	--

RAB = Roundabout, TWSC = Two-Way Stop Control, OWSC = One-Way Stop Control

XXX indicates the MOE does not meet the criteria thresholds

Table 6.17 – Capacity Analysis Results for Scenario 5B: Design Year Build (2042 PM)

No.	Intersection	Control Type	Parameter	Approach				
				NB	SB	EB	WB	Ovr
1	SR 32 & US 31	Signal	LOS	D	B	D	E	**D**
			Delay (sec/veh)	36.9	12.3	36.2	57.8	**39.0**
			95th % Queue Length (ft)	575	75	450	400	--
2	SR 32 & Poplar St/Shamrock Blvd	RAB	LOS	B	A	A	A	**A**
			Delay (sec/veh)	12.9	7.5	4.4	5.0	**5.4**
			95th % Queue Length (ft)	25	25	100	75	--
3	SR 32 & Mill St/Westlea Dr	TWSC	LOS	C	D	A		**A**
			Delay (sec/veh)	17.2	34.9	0.0		**1.1**
			95th % Queue Length (ft)	25	25	0		--
4	SR 32 & Union St	Signal	LOS	C	B	B		**B**
			Delay (sec/veh)	30.8	18.1	14.0		**18.3**
			95th % Queue Length (ft)	175	150	275		--
5	SR 32 & Walnut St	TWSC	LOS	C	D	A		**A**
			Delay (sec/veh)	15.4	28.3	0.0		**0.6**
			95th % Queue Length (ft)	25	25	0		--
6	SR 32 & Cherry St	TWSC	LOS	C	D	A		**A**
			Delay (sec/veh)	17.8	32.9	0.0		**1.6**
			95th % Queue Length (ft)	25	25	0		--
7	SR 32 & East St	RAB	LOS	A		A	A	**A**
			Delay (sec/veh)	6.5		3.8	4.2	**4.0**
			95th % Queue Length (ft)	25		75	50	--
8	Penn St & East St	OWSC	LOS		B		A	**A**
			Delay (sec/veh)		12.8		0.0	**1.0**
			95th % Queue Length (ft)		25		0	--
9	Penn St & Union St	Signal	LOS	A	B		C	**B**
			Delay (sec/veh)	7.5	10.3		23.0	**16.2**
			95th % Queue Length (ft)	175	150		175	--
10	Jersey St & Union St	TWSC	LOS	A	A	B	B	**A**
			Delay (sec/veh)	0.3	0.0	14.1	10.7	**1.6**
			95th % Queue Length (ft)	0	0	25	25	--
11	Jersey St (future) & Cherry St	TWSC	LOS	A	A	A	A	**A**
			Delay (sec/veh)	0.2	0.4	8.5	9.6	**4.3**
			95th % Queue Length (ft)	0	0	25	25	--

RAB = Roundabout, TWSC = Two-Way Stop Control, OWSC = One-Way Stop Control

XXX indicates the MOE does not meet the criteria thresholds

Table 6.18 – Capacity Analysis Results for Scenario 5C: Design Year Build (2042 AM)

No.	Intersection	Control Type	Parameter	Approach				
				NB	SB	EB	WB	Ovr
1	SR 32 & US 31	Signal	LOS	D	B	C	D	**D**
			Delay (sec/veh)	46.8	10.9	33.0	44.6	**37.6**
			95th % Queue Length (ft)	425	75	400	400	--
2	SR 32 & Poplar St/Shamrock Blvd	RAB	LOS	B	B	A	B	**B**
			Delay (sec/veh)	11.8	13.9	7.1	15.8	**11.8**
			95th % Queue Length (ft)	25	175	150	375	--
3	SR 32 & Mill St/Westlea Dr	TWSC	LOS	D	C		A	**A**
			Delay (sec/veh)	25.4	18.0		0.0	**1.6**
			95th % Queue Length (ft)	25	25		0	--
4	SR 32 & Union St	Signal	LOS	B	D		B	**C**
			Delay (sec/veh)	15.8	42.9		18.7	**22.7**
			95th % Queue Length (ft)	150	250		275	--
5	SR 32 & Walnut St	TWSC	LOS	C	B		A	**A**
			Delay (sec/veh)	15.1	13.2		0.0	**0.1**
			95th % Queue Length (ft)	25	25		0	--
6	SR 32 & Cherry St	TWSC	LOS	D	B		A	**A**
			Delay (sec/veh)	25.2	13.5		0.0	**0.3**
			95th % Queue Length (ft)	25	25		0	--
7	SR 32 & East St	RAB	LOS	A	A		A	**A**
			Delay (sec/veh)	3.6	6.9		3.6	**3.7**
			95th % Queue Length (ft)	50	25		50	--
8	Penn St & East St	OWSC	LOS	A	A	B		**A**
			Delay (sec/veh)	0.5	0.0	12.0		**1.2**
			95th % Queue Length (ft)	0	0	25		--
9	Penn St & Union St	TWSC	LOS	A	A	A	C	**A**
			Delay (sec/veh)	0.0	0.3	0.0	15.5	**1.6**
			95th % Queue Length (ft)	0	0	0	25	--
10	Jersey St & Union St	Signal	LOS	B	A	C		**B**
			Delay (sec/veh)	19.7	2.0	20.7		**17.8**
			95th % Queue Length (ft)	150	25	200		--
11	Jersey St (future) & Cherry St	TWSC	LOS	B	C	A		**A**
			Delay (sec/veh)	13.3	21.4	0.0		**1.4**
			95th % Queue Length (ft)	25	25	0		--

RAB = Roundabout, TWSC = Two-Way Stop Control, OWSC = One-Way Stop Control

XXX indicates the MOE does not meet the criteria thresholds

Table 6.19 – Capacity Analysis Results for Scenario 5C: Design Year Build (2042 PM)

No.	Intersection	Control Type	Parameter	Approach				
				NB	SB	EB	WB	Ovr
1	SR 32 & US 31	Signal	LOS	D	B	D	E	**D**
			Delay (sec/veh)	36.9	12.3	36.2	57.8	**39.0**
			95th % Queue Length (ft)	575	75	450	400	--
2	SR 32 & Poplar St/Shamrock Blvd	RAB	LOS	B	A	A	A	**A**
			Delay (sec/veh)	12.1	7.5	4.4	4.4	**4.8**
			95th % Queue Length (ft)	25	25	100	75	--
3	SR 32 & Mill St/Westlea Dr	TWSC	LOS	C	B		A	**A**
			Delay (sec/veh)	19.8	14.9		0.0	**1.9**
			95th % Queue Length (ft)	25	25		0	--
4	SR 32 & Union St	Signal	LOS	C	D		B	**C**
			Delay (sec/veh)	21.1	36.9		13.4	**20.1**
			95th % Queue Length (ft)	150	250		175	--
5	SR 32 & Walnut St	TWSC	LOS	C	B		A	**A**
			Delay (sec/veh)	19.8	14.8		0.0	**0.2**
			95th % Queue Length (ft)	25	25		0	--
6	SR 32 & Cherry St	TWSC	LOS	C	B		A	**A**
			Delay (sec/veh)	16.1	12.3		0.0	**0.3**
			95th % Queue Length (ft)	25	25		0	--
7	SR 32 & East St	RAB	LOS	A	A		A	**A**
			Delay (sec/veh)	3.6	7.9		3.4	**3.7**
			95th % Queue Length (ft)	75	25		50	--
8	Penn St & East St	OWSC	LOS	A	A	A		**A**
			Delay (sec/veh)	0.5	0.0	9.8		**1.6**
			95th % Queue Length (ft)	0	0	25		--
9	Penn St & Union St	TWSC	LOS	A	A	A	B	**A**
			Delay (sec/veh)	0.0	0.2	0.0	14.1	**1.0**
			95th % Queue Length (ft)	0	0	0	25	--
10	Jersey St & Union St	Signal	LOS	C	A	C		**B**
			Delay (sec/veh)	22.6	3.2	20.7		**18.4**
			95th % Queue Length (ft)	200	25	275		--
11	Jersey St (future) & Cherry St	TWSC	LOS	C	D	A		**A**
			Delay (sec/veh)	18.0	34.9	0.0		**1.1**
			95th % Queue Length (ft)	25	25	0		--

RAB = Roundabout, TWSC = Two-Way Stop Control, OWSC = One-Way Stop Control
XXX indicates the MOE does not meet the criteria thresholds

7.0 Network Performance Measures

While the information contained in **Section 6.0** summarizes performance of individual intersections by delay, LOS, and queue length, the tables in this section combine and summarize four (4) performance measures for all intersections in the network: total delay, total stops, total travel time, and total fuel consumption. The performance measures were calculated (not field-measured) by the Synchro model. The model summarizes data for all vehicles in the network. The network performance measures developed by Synchro can be found in **Table 7.1** and **Table 7.2** for the AM and PM peak, respectively.

Table 7.1 – Synchro Network Performance Measures (AM Peak Hour)

Performance Measures	Scenario				
	Scenario 2 Opening Year 2022 (No-Build)	Scenario 4 Design Year 2042 (No-Build)	Scenario 5A Design Year 2042 (4-Lane)	Scenario 5B Design Year 2042 (SR 32 EB)	Scenario 5C Design Year 2042 (SR 32 WB)
Total Delay (hr)	73	265	73	69	71
Total Stops	7,731	10,086	10,571	10,834	10,856
Total Travel Time (hr)	151	356	168	150	163
Fuel Consumed (gal)	184	353	218	196	211

Table 7.2 – Synchro Network Performance Measures (PM Peak Hour)

Performance Measures	Scenario				
	Scenario 2 Opening Year 2022 (No-Build)	Scenario 4 Design Year 2042 (No-Build)	Scenario 5A Design Year 2042 (4-Lane)	Scenario 5B Design Year 2042 (SR 32 EB)	Scenario 5C Design Year 2042 (SR 32 WB)
Total Delay (hr)	80	430	89	82	83
Total Stops	8,179	11,509	11,631	11,878	11,698
Total Travel Time (hr)	164	527	192	174	182
Fuel Consumed (gal)	201	491	248	227	233

As shown in the tables above, the Scenario 4 Design Year 2042 (No-Build) PM peak results in a substantial increase in total delay and total travel time as compared to the three Scenario 5 design alternatives. The 4-lane design alternative (5A) is anticipated to result in fewer stops during both the AM and PM peak scenarios when compared to the one-way pair options (5B and 5C). In general, the results indicate that all three design alternatives are anticipated to result in improved operations along SR 32. The two one-way pair options are anticipated to improve the conditions as compared to the no-build scenario, with neither option being superior.

8.0 Alternative Intersection Control Types

So as to provide a wide-ranging analysis, alternative control types were considered at multiple locations throughout the SR 32 corridor for the multiple scenarios and alternatives.

8.1 SR 32 & Poplar Street / Shamrock Boulevard

Due to the recent construction of the SR 32 & Poplar Street / Shamrock Boulevard roundabout, and the ability to expand the capacity utilizing the existing pavement, reverting to a signalized intersection at this location was not considered.

8.2 SR 32 & Union Street

A roundabout was preliminarily considered at this intersection throughout the initial analysis. However, due to concerns with the amount of space required to accommodate a properly sized roundabout, further analysis was not completed. For Design Year 2042 Build (Scenario 5), it is anticipated that a two-lane roundabout with turn lanes, similar in design to the SR 32 & Poplar Street / Shamrock Boulevard roundabout would be required. This would potentially impact all four (4) corners of this historically sensitive intersection, in addition to impacting the existing park. Therefore, additional analysis was not provided.

8.3 SR 32 & East Street

A signalized intersection was discussed at the SR 32 & East Street intersection during preliminary analysis and discussions with INDOT and City of Westfield staff. The final configuration of Design Year 2042 Build (Alternative A), which included four (4) lanes and implementing access management strategies along SR 32, resulted in the need to provide U-turn movements at both ends of the corridor in order to accommodate the right-turning only traffic at the existing side-streets. These vehicles need to be provided a safe and reliable mechanism for heading in their intended direction without forcing all of these movements to the traffic signal at SR 32 & Union Street. Due to safety and access concerns with requiring these U-turn movements at a signalized intersection, only a roundabout was analyzed at the SR 32 & East Street intersection.

9.0 Findings and Recommendations

Based on capacity analysis and field observations of the existing conditions, SR 32 in downtown Westfield is known to experience congestion during the 2019 AM and PM peak hours. The Synchro analysis has shown that the 95th percentile queue length at SR 32 & Union Street exceeds 950 feet for the westbound approach in the AM and 900 feet for the eastbound approach in the PM. Due to the extensive queuing on SR 32 at Union Street, traffic flow is impeded at other driveways and major intersections along the corridor. In particular, the Poplar Street/Shamrock Boulevard roundabout is negatively impacted when slowed or stopped vehicles on SR 32 create a gridlock and prevent other vehicles from entering the roundabout. Slowed/stopped traffic through a roundabout compromises the safety of the intersection as drivers expectations change and typical gaps in traffic are no longer available. Since the north leg of the roundabout provides access to Riverview Health and the Westfield Intermediate and Middle Schools, safety at the roundabout is of the utmost concern.

By the projected Opening Year (2022) of the project, development is expected to be in place along SR 32 west of US 31. The development is anticipated to increase traffic volumes on SR 32 in downtown Westfield, which is expected to worsen the aforementioned conditions. During the Opening Year 2022 (Scenario 2) AM and PM peak hours, the Synchro analysis shows that several movements will operate at LOS F and the 95th percentile queue lengths exceed 1,000 feet for the respective peak directions. Widening of SR 32 will be required in order to mitigate the congestion issues.

Based upon the analysis of the design alternatives and the recommended geometrics, all alternatives are anticipated to operate within the level of service, delay, and queue standards established at the outset of this study for Design Year 2042 Build (Scenario 5). These findings will be included in the Environmental Assessment which is anticipated to analyze the full impacts of these scenarios.

The 4-lane design alternative with access management (Scenario 5A) is anticipated to result in fewer stops during both the AM and PM peak scenarios when compared to the one-way pair options (Scenarios 5B and 5C) based on the Synchro network performance measures. In general, the results indicate that all three design alternatives are anticipated to result in improved operations along SR 32. The two one-way pair options are anticipated to improve the conditions as compared to the no-build scenario, with neither option being superior.

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M E M O R A N D U M

DATE: October 16, 2019

TO: SR 32 Westfield Reconstruction Design Team

FROM: Gannon Grimmer, PE, Patrick O'Connor, PE, PTOE

RE: SR 32 Westfield Reconstruction – Traffic Analysis for Modified Access at Union Street

Introduction

Based upon comments received during the public comment period, an additional traffic analysis has been completed for the SR 32 Westfield Reconstruction Project. An alternative was recommended in which the SR 32 & Union Street intersection is modified to: (1) a right-in/right-out (RIRO) intersection, or (2) no access to vehicular traffic. The goal of these alternatives is to prevent widening at the intersection of SR 32 & Union Street in order to preserve the historic district. The purpose of this memorandum is to document the traffic analysis and findings.

Description of Alternative Concepts

For the purposes of this analysis, SR 32 is assumed to be widened to four (4) lanes from Poplar Street to East Street. Additionally, SR 32 would be required to be an undivided section from approximately Mill Street to Walnut Street due to right-of-way restrictions which are required to minimize impacts on the existing structures in the historic district. The future extension of Jersey Street is also assumed to be constructed, as this is critical to the functionality of these concepts. It is anticipated that due to the free-flow nature of SR 32 through this intersection that pedestrian accommodations, such as a signal or HAWK, would be required in order to provide safe access for pedestrians crossing SR 32.

Right-In/Right-Out

In this concept, access at SR 32 & Union Street would be restricted to a RIRO only intersection. This only allows for right turns on/off of SR 32. With this configuration, all left turns at the intersection would be prohibited, and through movements along Union Street would also be prohibited.

No Access

In this concept, no access to Union Street would be allowed at SR 32. Vehicle access on Union Street would be terminated approximately 200' north and south of SR 32 at the nearby alleys. This creates a plaza-like design at the node of the SR 32 & Union Street intersection, in which only pedestrian access is permitted. With this configuration, only east-west through movements along SR 32 would be possible. A rough sketch of the No Access concept is shown in **Figure 1**, as provided during the public comment period. This sketch was included for conceptual purposes only.

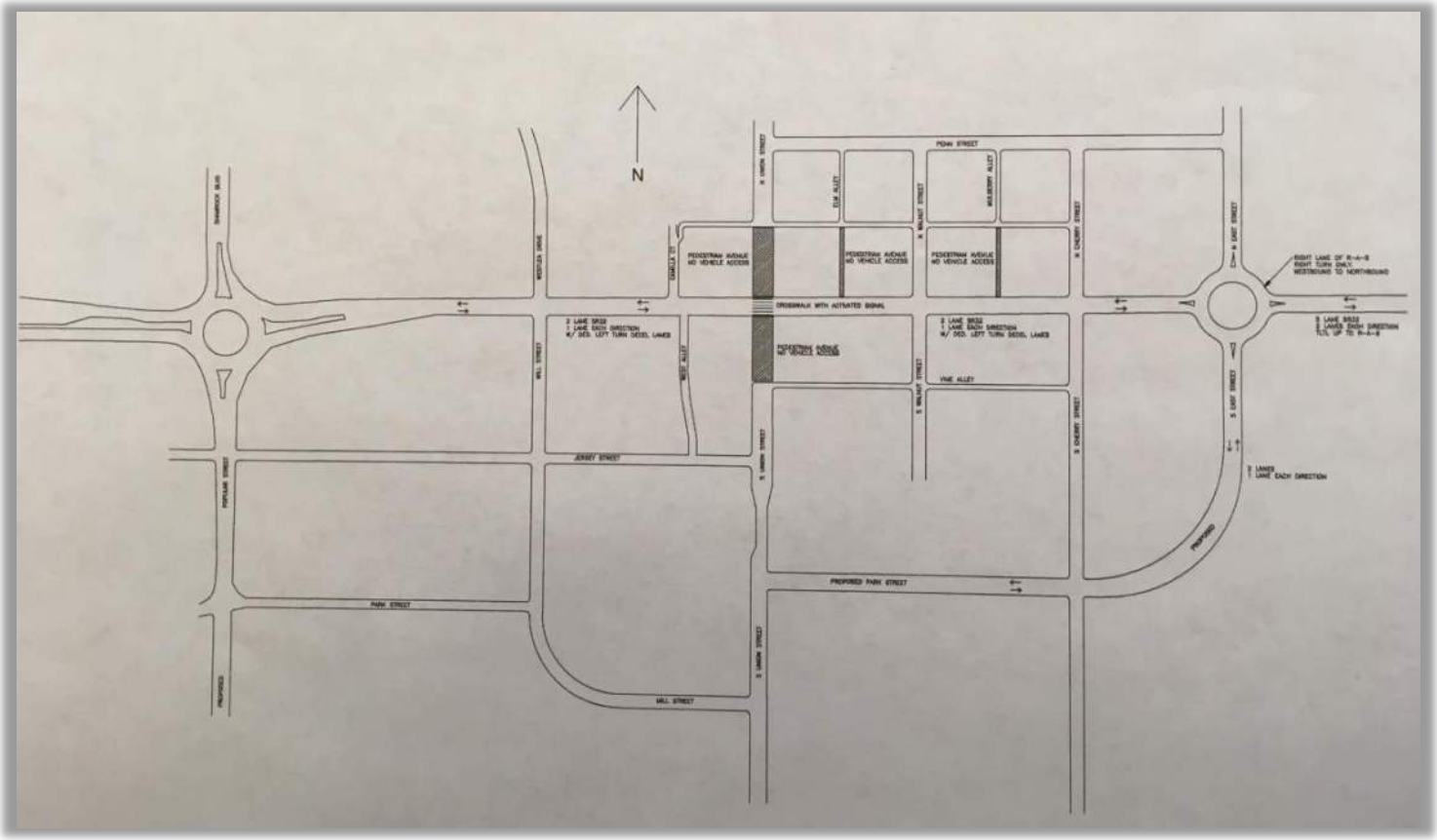

Figure 1 – Sketch of No Access Concept

Traffic Volume Redistribution

The restricted access at SR 32 & Union Street would require local drivers to find alternate routes through downtown Westfield. The majority of redistributed traffic is expected to be pushed toward the existing Poplar Street roundabout or the proposed East Street roundabout at either end of the study corridor. Drivers would then utilize the minor local roadway network to get back to Union Street to continue to their destination.

Traffic volumes were redistributed based on a methodology of identifying the next most logical route for traffic based on the respective concept. Since origin-destination data is not available, traffic volumes were assumed to be redistributed with the most practical route available.

Capacity Analysis

A capacity analysis was evaluated for both concepts to determine their feasibility from a traffic operations standpoint. The capacity analysis was completed based upon the Synchro and SIDRA files from the *SR 32 Westfield Reconstruction Traffic Operations Analysis* approved by INDOT on May 30, 2019. The analysis of these alternative concepts followed the same methodologies utilized in the Traffic Operations Analysis report. The results of the capacity analysis are summarized in the following sections. Pedestrian operations and impacts were not included in the analysis.

<u>Right-In/Right-Out</u>

Based on the anticipated traffic volume redistribution for the RIRO concept, a heavy volume of eastbound and westbound right turns are expected to occur during the peak hours at SR 32 & Union Street. The right-turn volume in both directions is high enough to warrant dedicated right-turn lanes on SR 32. Due to the need for

dedicated right-turn lanes (and thus required widening to SR 32), this alternative concept is not considered to meet the goal of this analysis and will not be evaluated further.

No Access

The capacity analysis for the No Access concept mainly focuses on the roundabouts at Poplar Street and at East Street, as these intersections are anticipated to experience the highest increase in traffic, and thus would be critical to the performance of the corridor. The capacity analysis results for the roundabout intersections are summarized in **Table 1**. These traffic volumes reflect Scenario 5A from the traffic study and account for the redistribution of traffic based on modified access at SR 32.

Table 1 – Capacity Analysis Results: 2042 AM and PM Peak Hour

Intersection	Approach	2042 AM			2042 PM		
		Delay (sec/veh)	LOS	95th % Queue Length (ft)	Delay (sec/veh)	LOS	95th % Queue Length (ft)
SR 32 & Poplar St	NB	14.0	B	75	13.7	B	50
	SB	11.4	B	125	7.7	A	25
	EB	7.1	A	150	4.4	A	100
	WB	22.1	C	425	5.7	A	75
	Overall	**13.7**	**B**	--	**6.0**	**A**	--
SR 32 & East St	NB	5.4	A	25	8.5	A	75
	SB	8.1	A	25	8.9	A	50
	EB	5.9	A	50	6.5	A	100
	WB	5.5	A	75	5.7	A	75
	Overall	**5.9**	**A**	--	**6.7**	**A**	--

The capacity analysis results from **Table 1** show that both roundabouts are expected to operate at LOS C or better during the peak hours, and the 95th percentile queue lengths at all approaches show that there would be minimal impacts to adjacent intersections. These results indicate that the roundabouts are capable of handling the additional traffic at an acceptable level of performance.

Impacts were also considered for all of the intersections on Penn Street and Jersey Street that are anticipated to have a large increase in traffic volumes or a major shift in traffic patterns. The capacity analysis for these stop-controlled intersections showed that all are expected to operate at LOS C or better during the peak hours without any significant queuing concerns. These results indicate that the other intersections impacted by new traffic patterns are capable of handling the additional traffic at an acceptable level of performance.

The future extension of Jersey Street is worth noting with regard to this proposed concept. An evaluation of the Poplar Street roundabout (without the construction of the Jersey Street extension) showed that the roundabout operations would degrade to the point in which the intersection no longer provides an acceptable level of performance. Therefore, the Jersey Street extension is required in order for the No Access concept to be feasible.

Network-Related Traffic Impacts

The capacity analysis in the previous section of this memo mainly focused on the potential impacts to the SR 32 corridor at an intersection-level only. However, the redistribution of traffic volumes and the alteration of current traffic patterns also has an impact on other traffic performance measures.

Penn Street

Penn Street is expected to have a large increase in traffic volumes based on the traffic volume redistribution assumptions. The current AADT on Penn Street is estimated to be 750 vpd, and the projected AADT on Penn Street with the No Access concept is estimated to be 6,000 vpd. This increase in traffic would likely require new pavement on Penn Street and require the removal of parking spaces in close proximity to Union Street and East Street. Additionally, the increase in traffic could potentially be a disruption to residents who live on Penn Street.

Travel Time

An overall increase in travel time is another impact of the No Access alternative. Due to the limited access on SR 32, local users of the roadway network will be subjected to finding alternate routes. These routes will mostly consist of low-speed roadways and will require a further distance to be traveled than the current condition. The increase in network travel time was quantified by comparing a "before" and "after" scenario in which equivalent routes were used as the basis of the comparison. The travel time comparison is summarized in **Table 2**. The travel times were calculated based on distance traveled divided by posted speed.

Table 2 – Travel Time Comparison

Condition	Travel Time (min)
"Before" (Full Access at Union Street)	4.7
"After" (No Access at Union Street)	10.0
Difference	+ 5.2

The "before" and "after" travel time values are relative to their points of measurement and should be considered arbitrary. However, the **difference** in the values reflects the actual increase in travel time that is expected to occur for all vehicle routes (combined) which will be impacted by the removal of access at Union Street. The travel time comparison shows that the average added travel time for vehicles will be approximately five (5) minutes.

A monetary value can be applied to the increase in travel time as it relates to the estimated value of delay time for vehicle drivers and passengers. The *2019 Urban Mobility Report* published by The Texas A&M Transportation Institute estimates the "value of delay time for personal travel at $18.12 per person per hour." This value of delay time was applied to the expected increase in travel time for the total volume of weekday drivers that will be impacted across the period of an entire year. Based on the calculations, the estimated annual cost attributed to an increase in travel time is **$1.0M per year** for all combined drivers impacted by the removal of access at Union Street.

Pedestrian Crossing

A protected pedestrian crossing on SR 32 will need to be provided in lieu of removing the traffic signal at the intersection at Union Street. The City of Westfield has expressed the desire for a protected pedestrian crossing to remain in the core of downtown. A high-intensity activated crosswalk beacon (HAWK) would likely be provided in replacement of the traffic signal.

The presence of a HAWK, or another type of pedestrian crossing beacon, is noteworthy as it means that SR 32 will not be completely free-flow with the No Access concept. Operations on SR 32 will behave similarly as if a signal was still present at Union Street. Therefore, it is unlikely that the No Access concept provides travel time savings for through vehicles along SR 32 while greatly impacting the travel times for all other movements that utilize this intersection.

Findings

The findings of the alternative concept evaluation are summarized as follows:

- The RIRO concept does not meet the goal of the alternative
    - Widening at SR 32 & Union Street required
- No Access concept does not meet the goal of the alternative
    - Jersey Street extension must be constructed
    - AADT on Penn Street increases to approximately 6,000 vpd
    - Added travel time cost of $1.0M per year
    - Required installation of pedestrian accommodations (signal, HAWK)

While the No Access concept appears to meet the goal of the alternative analysis by avoiding widening at the node of the SR 32 & Union Street intersection, there are several ancillary impacts to the community that are not prudent to the overall goal of the SR 32 Westfield Reconstruction project.

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M E M O R A N D U M

DATE: January 22, 2020

TO: SR 32 Westfield Reconstruction Design Team

FROM: Gannon Grimmer, PE, Patrick O'Connor, PE, PTOE

RE: SR 32 Westfield Reconstruction – Traffic Analysis for Jersey Street Extension

Introduction

The purpose of this memorandum is to summarize the traffic operations for the SR 32 Westfield Reconstruction study corridor without the Jersey Street extension. The *SR 32 Westfield Reconstruction Traffic Operations Analysis* (TOA), dated May 30, 2019, had assumed that the Jersey Street extension would be implemented prior to the beginning of construction of the SR 32 widening project. Therefore, the capacity analysis conducted for the TOA assumed traffic would be able to use Jersey Street and have been included in this memorandum to serve as comparison to the original analysis.

Due to the nature of the funding for the SR 32 widening project, the Jersey Street extension must be considered a separate project, and the traffic analysis should be re-evaluated without Jersey Street. This traffic analysis was conducted for a scenario *without* the Jersey Street extension to determine if any additional improvements would be required due to a different set of traffic patterns. This memorandum documents the traffic analysis and findings.

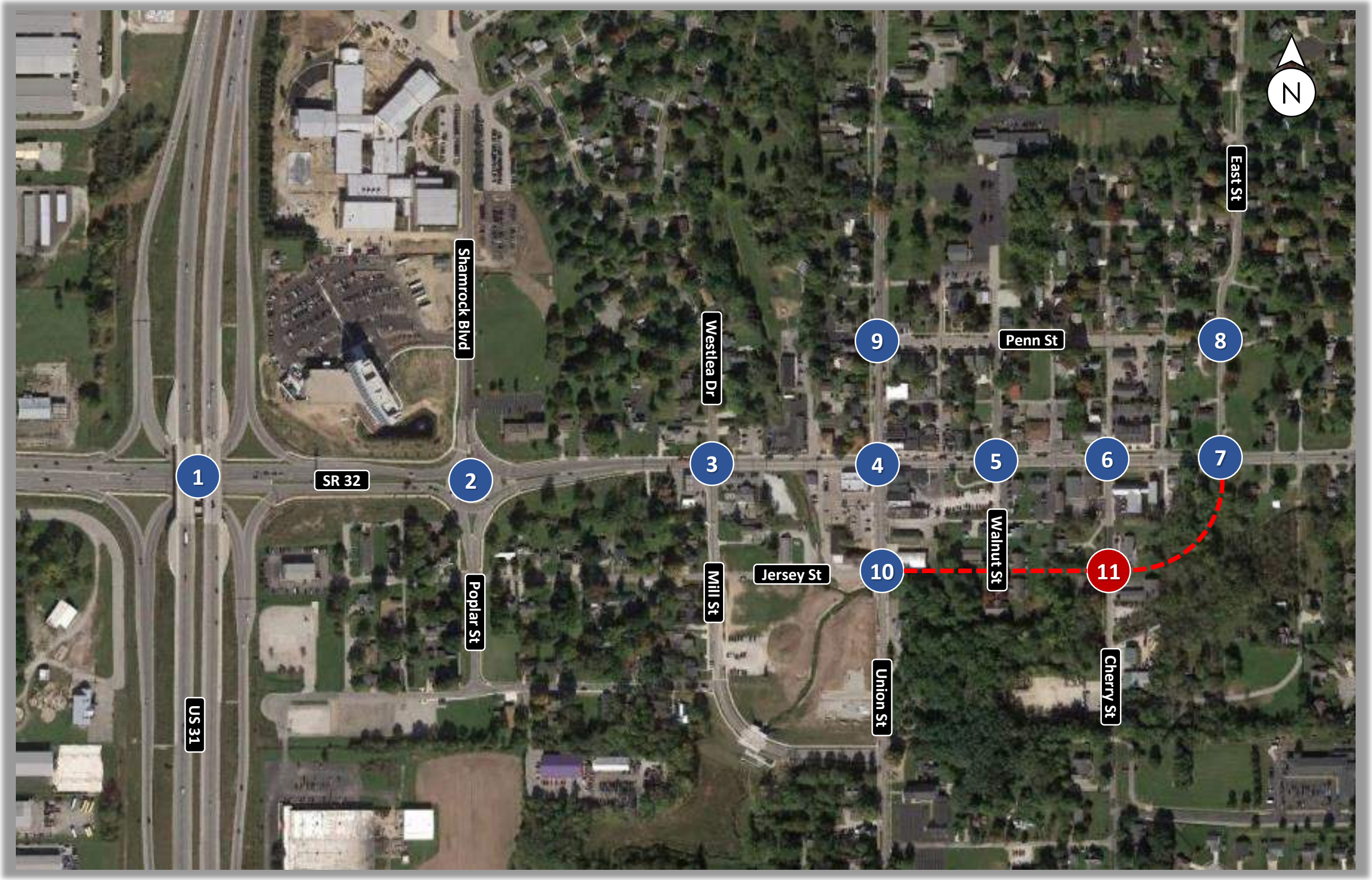
Description of Jersey Street Extension

The proposed Jersey Street extension spans from Union Street to East Street with a tie-in at SR 32. A conceptual alignment of the Jersey Street extension is shown in **Figure 1**. This figure includes all of the study intersections from the TOA to provide additional context for this memo. The following two (2) scenarios will be referenced throughout this memorandum:

- Scenario 1 – With the Jersey Street extension (from TOA)
- Scenario 2 – Without the Jersey Street extension

Traffic Volumes

The traffic volumes for Scenario 1 reflect the same volume matrix that was used for the analysis in the previously referenced TOA. The traffic volumes for Scenario 2 reflect a redistribution of traffic through the study area without the proposed Jersey Street extension. The only significant change in traffic patterns is with the westbound left-turn movement from SR 32. It was assumed these left turns would shift from Jersey Street to Union Street. The remaining traffic volumes were redistributed to access SR 32 from the existing side streets and not the proposed connection at Jersey Street & SR 32.



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Legend

1 Intersection Number (Existing)

1 Intersection Number (Future)

Jersey Street Extension

SR 32 Reconstruction Westfield, IN

Figure 1

Study Area w/ Jersey Street Extension

Capacity Analysis

A capacity analysis was performed for the new scenario without the Jersey Street extension to compare to the previous results from the TOA for the scenario with the Jersey Street extension. The analysis followed the same methodology procedures that were utilized in the original TOA and approved by INDOT staff. The Jersey Street extension will impact traffic patterns for Alternative A and Alternative B from the TOA and were evaluated for this memorandum. Alternative C, however, requires the Jersey Street extension; therefore, Alternative C was not further evaluated. A description of each of the design alternatives from the TOA is provided in **Table 1** for reference.

Table 1 – SR 32 Design Alternatives

Alternative	Roadway Network
A	SR 32 4-Lane Section (with Access Management)
B	One-Way Pair (SR 32 EB, Penn Street WB)
C	One-Way Pair (SR 32 WB, Jersey Street EB)

A summary of the LOS results comparison for the Jersey Street scenarios is provided in **Table 2**. The LOS values represent the worst-case overall intersection performance for the design year 2042 peak hour.

Table 2 – LOS Summary

Intersection	Scenario 1* (w/ Jersey Street)		Scenario 2 (w/o Jersey Street)	
	Alt A	Alt B	Alt A	Alt B
SR 32 & Union St	C	C	C	C
SR 32 & East St	A	A	A	A

**From TOA dated 5/30/2019*

The capacity analysis results from **Table 2** indicate that both of the major intersections that would be impacted by the Jersey Street extension are expected to operate at the same LOS with or without Jersey Street for both Alternative A and Alternative B.

Findings

The capacity analysis has shown that the major intersections along the SR 32 study corridor are expected to operate at the same LOS with and without the Jersey Street extension. Based upon these results, no additional intersection improvements would be required (beyond those already recommended in the TOA) in the event that the Jersey Street extension does not get constructed prior to the SR 32 widening project.

Due to the existing roadway connectivity along SR 32 through the study area, the extension of Jersey Street is not expected to cause a major shift in traffic patterns. Most traffic will likely keep using the same routes as today with the exception of westbound left turns at the intersection of SR 32 & Union Street. Since the peak hour volume of these left turns is less than 30 vehicles per hour, this results in the negligible change in intersection delay of both scenarios.

Appendix D

CITY OF
Westfield
INDIANA

July 15, 2019

Subject: State Road 32 in Westfield

To: Whom It May Concern

This letter is written to formally clarify the City of Westfield's position on the subject of decommissioning State Road 32 in Westfield, Indiana.

The City of Westfield is adamantly against decommissioning State Road 32 through its downtown area. The City does not have maintenance dollars budgeted towards the long-term maintenance of this roadway, nor do we have the desire to maintain a road which has functioned as an east-west state route since before the City of Westfield became a city.

A decommissioning of State Road 32 would represent a tremendous burden to our taxpayers and would result in other vital infrastructure projects being delayed or cancelled to cover the long-term costs of maintaining State Road 32. It would be unpalatable from both a financial and programmatic standpoint.

Sincerely,

John Nail
City Engineer
City of Westfield

Public Works Department

(317) 804-3100 office
(317) 804-3190 fax

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From: McCoy, Dan
Sent: Friday, July 12, 2019 2:35 PM
To: Beck, Jennifer <JBeck@indot.IN.gov>
Cc: VanVleet, Jeremy <JVanVleet@indot.IN.gov>
Subject: RE: SR 32 Memo's Request

Jennifer,

Regarding the letter from SHPO for the SR 32 Westfield project, the idea of a roadway transfer and rerouting of traffic is not reasonable or feasible. Other projects cited in the letter had the benefit of established "bypass" roadways on which to put displaced traffic. SR 32 is the major east-west thoroughfare for Westfield and Noblesville and relied upon by a significant amount of commuter traffic each day. Whether or not this traffic could be described as through traffic is immaterial to the case since the interchange of US 31 at SR 32 forms a major connection point via the US 31 freeway to I-465 at the west end of the SR 32 corridor. Traffic data shows that US 31 at SR 32 is a destination point in addition to downtown Westfield itself. Of great significance is the fact that INDOT and FHWA invested millions of dollars into the US 31 Hamilton County freeway and the interchange at SR 32 to provide improved safety and traffic operations, access, connectivity and increased opportunities for economic development. Disallowing the traveling public from using SR 32 via a road transfer or any other means would call into question the prior investment and the environmental study on which the US 31 freeway was founded. Furthermore, the communities of Westfield and Noblesville have not expressed any interest in a SR 32 road transfer agreement. However, both cities are interested in safety and capacity improvements on the SR 32 corridor. Even if such an agreement were to be reached and truck traffic routed on another road, the high passenger car traffic volumes would still use the corridor as it is the shortest path to the US 31 freeway.

Thank you,

Daniel McCoy, P.E.
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